SANYO

Service Manual

Blood Bank Refrigerator

FILE No.

MBR-1405G
MBR-1405GR

SANYO Electric Co., Ltd.
Biomedical Business Division

SM9910230

Effective models

This service manual is effective following models.

Model name	Model code	Voltage and Frequency	
MBR-1405G	823 630 62	220V	50Hz
MBR-1405GR	823 630 51	115V	60Hz
	823 630 52	220V	50Hz
	823 630 54	230-240V	50Hz

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Specifications

Structural specifications

Model	MBR-1405G	MBR-1405GR
External dimensions	W1440 x D830 x H1950 (mm)	
Internal dimensions	W1320 x D710 x H1500 (mm)	
Effective capacity	1301 L	
Exterior	Painted steel	
Interior	Painted steel	
Insulation	Rigid polyurethane foamed-in place	
Outer door	2 doors, Painted steel, provided with 2-layer glass window	
Inner door	6 doors, Acrylic resin	
Outer door lock	2	
Shelf	12, Hard steel wire on polyester coating Allowable load; 40kg/pc	————————
Drawer	————————	12, Stainless steel Allowable load; 40kg/pc
Caster	4 pcs (2 leveling legs on front)	
Access port	2 (Right side, left side), Inner diameter; 30mm	
Cooling method	Forced cool air circulation	
Evaporator	Fin and tube type	
Condenser	Fin and tube type	
Compressor	1, Hermetic type, output: 250W	
Compressor oil	SL32D1	
Refrigerant	R-404A	
Illumination	1 fluorescent lamp, 40W	
Weight	276 kg	315 kg
Power source	Local	
Accessories	1 set of key	
Optional components	Interface board (MTR-480) LAN Interface board (MTR-L03)	

Control specifications

Model		MBR-1405G	MBR-1405GR
Temperature controller		Electronic control system Sensor : Thermistor	
Temperature display		LED digital (Unit; 0.1℃)	
Alarm	High temp.	When chamber temp. is higher than set temp. +6℃ (Factory default), ALARM lamp blinks and audible alarm sounds intermittently. Audible alarm sounds again after 30 min. elapse if unit keeps alarming condition. Setting range; +5.0 ~ +9.0℃	
	Low temp.	When chamber temp. is lower than set temp. 2℃ (Factory default), ALARM lamp blinks and audible alarm sounds intermittently. Audible alarm sounds again after 30 min. elapse if unit keeps alarming condition. Setting range; 1.0 ~ 4.0℃	
	Door	DOOR lamp illuminates and audible buzzer sounds intermittently after 2 min. elapses.	
	Power failure	ALARM lamp blinks and audible alarm sounds intermittently for 24 hours.	
	Remote alarm	DC30V, MAX 2A, N.O.-COM. N.C.-COM. Remote alarm activates when unit is in alarming condition and in power failure.	
Notice of battery life		When battery accumulation time expires 2.8 years (2 years and 10 months), 'F-1' and chamber temperature are alternately displayed. Audible alarm and remote alarm do not activate.	
Notice of fan motor life		When condensing fan motor accumulation time expires 5.6 years (5 years and 8 months), 'F-2' and chamber temperature are alternately displayed. Audible alarm and remote alarm do not activate. Note) Notice of fan motor life can be set alternate ON/OFF in F43.	
Temperature protection		Heater turns off and compressor turns on when temperature in thermostat is higher than +12℃. Compressor turns off and heater turns on when alarm sensor temperature is lower than +2℃.	
Defrosting		Cycle defrost and forcible defrost Sensor; Thermistor (Type; 502AT-1)	
Control panel		ALARM: Alarm indicator DOOR: Door check indicator UPPER: Temperature display indicator LOWER: Temperature display indicator BUZZER: Alarm buzzer stop key ALARM TEST: Alarm test key UPPER/LOWER: Temperature display changeover key CAL: Calibration key ▶▶ : Scroll key ▲ : Up arrow key	
Self diagnosis function		When temp. sensor or defrost sensor is failed; Error code and chamber temperature are displayed alternately. Remote alarm contact activates and audible alarm sounds.	
Compressor protection		Overload relay When comp. sensor detects fan motor lock, compressor forcibly turns off before overload activates.	

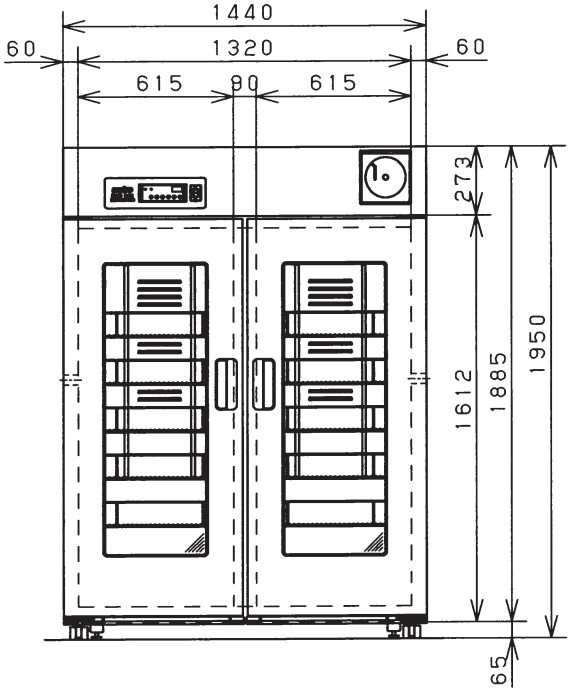
Performance specifications

Model	MBR-1405G		MBR-1405GR	
Storage temperature	4℃ (AT; +35℃)			
Temperature distribution	+/- 1.5℃			
Noise level	48 dB (A scale, 50Hz)			
Maximum pressure	1992 kPa			
Rated voltage	AC115V	AC220V	AC230V	AC240V
Rated frequency	60Hz	50Hz	50Hz	50Hz
Power consumption	375W	355W	360W	380W

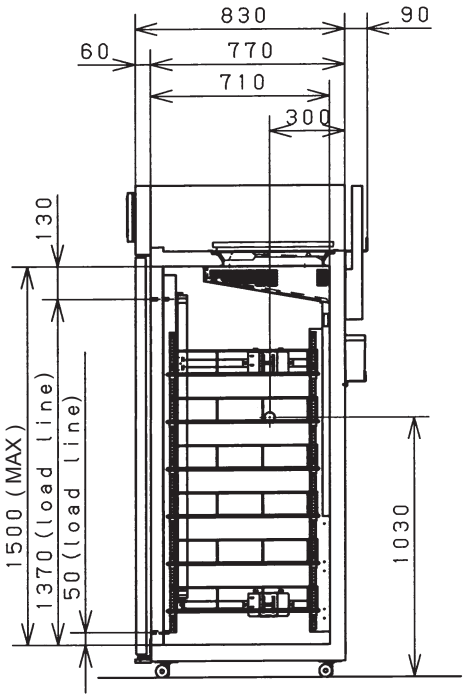
Note) Design or specifications will be subject to change without notice.

Dimensions

<MBR-1405G>

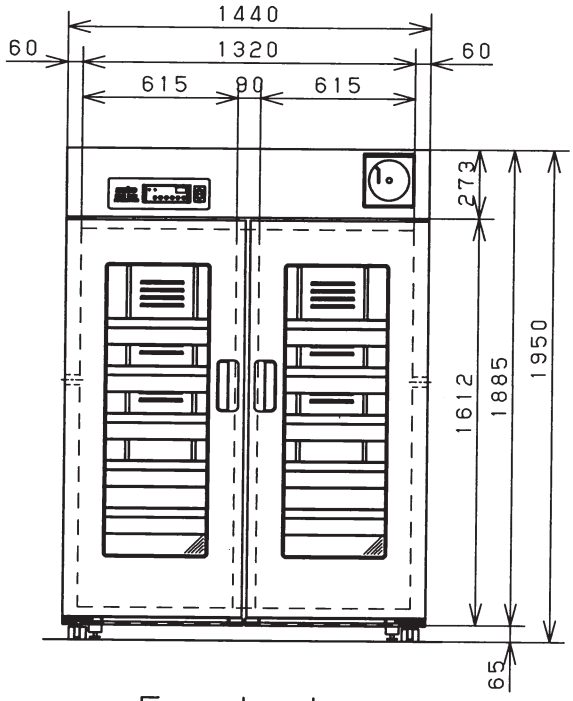


Front view

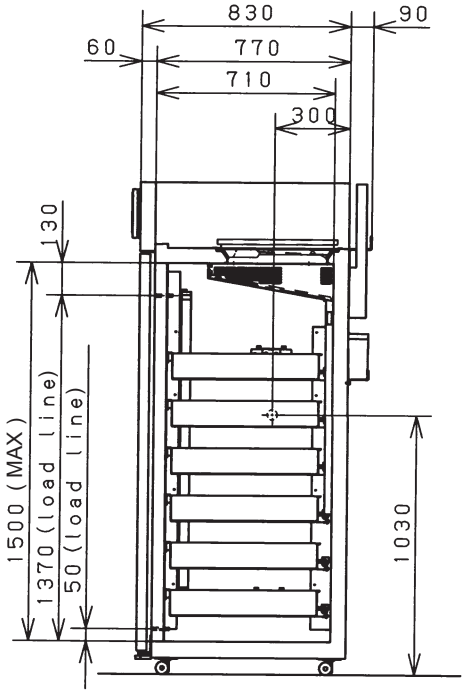


Side view

<MBR-1405GR>

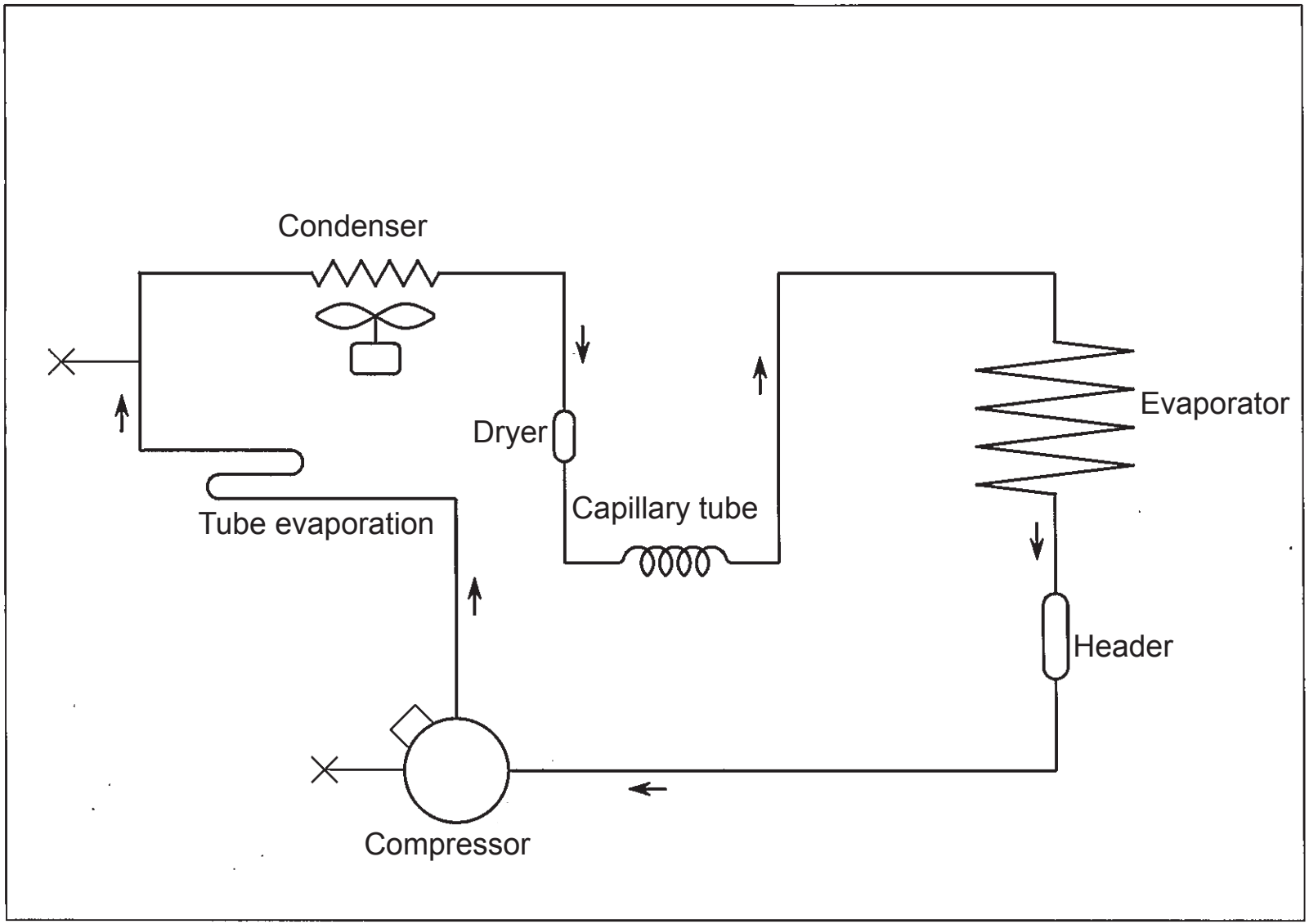


Front view



Side view

Refrigeration circuit



Cooling unit parts

Parts descriptions	Specifications	
	MBR-1405G	MBR-1405GR
Compressor		
	For 115V, 60Hz	
Type	RL2557-PB	
Compressor code	7FB-0-M101-008-02	
Rated power supply	Single phase, 110/115V, 60Hz	
Refrigeration oil	Type: SL32D1 Charged q'ty: 290+/-10 cc	
Cooling method	Forced cool air circulation	
	For 220~240V, 50Hz	
Type	RL2557-SA	
Compressor code	7FB-0-M101-008-03	
Rated power supply	Single phase, 220~240V, 50Hz	
Refrigeration oil	Type: SL32D1 Charged q'ty: 290+/-10 cc	
Cooling method	Forced cool air circulation	
Condenser		
Type	Fin and tube P4.5 x W334 mm 8columns, 3lines, 73pcs	
Tube evaporation	ϕ6.35 x P30 x W390 mm, 4columns	
Frame pipe	None	
Evaporator Type	Fin and tube ϕ8.0 x P7.5~20 x W556 mm	
Capillary tube		
Resistance	98 PSI	
Length	1200 mm	
Outer diameter	Φ2.0 mm	
Inner diameter	φ0.9 mm	
Refrigerant Type	R-404A Charge q'ty: 330 g	
Dryer Type	XH-9 Charge q'ty: 18 g	
Condensing fan motor		
	For 115V, 60Hz	
Type	SE4-D041N1P ϕ196, 3pcs. Material: ABS Output: 4W	
	For 220/230/240V, 50Hz	
Type	SE4-D041N5P ϕ196, 3pcs. Material: ABS Output: 4W	
Cooling fan motor		
	For 115V, 60Hz	
Type	FU2-B041C1MP ϕ120, 4pcs. Material: ABS Output: 4W	
	For 220/230/240V, 50Hz	
Type	FU2-B041C5MP ϕ120, 4pcs. Material: ABS Output: 4W	

Specifications of sensor

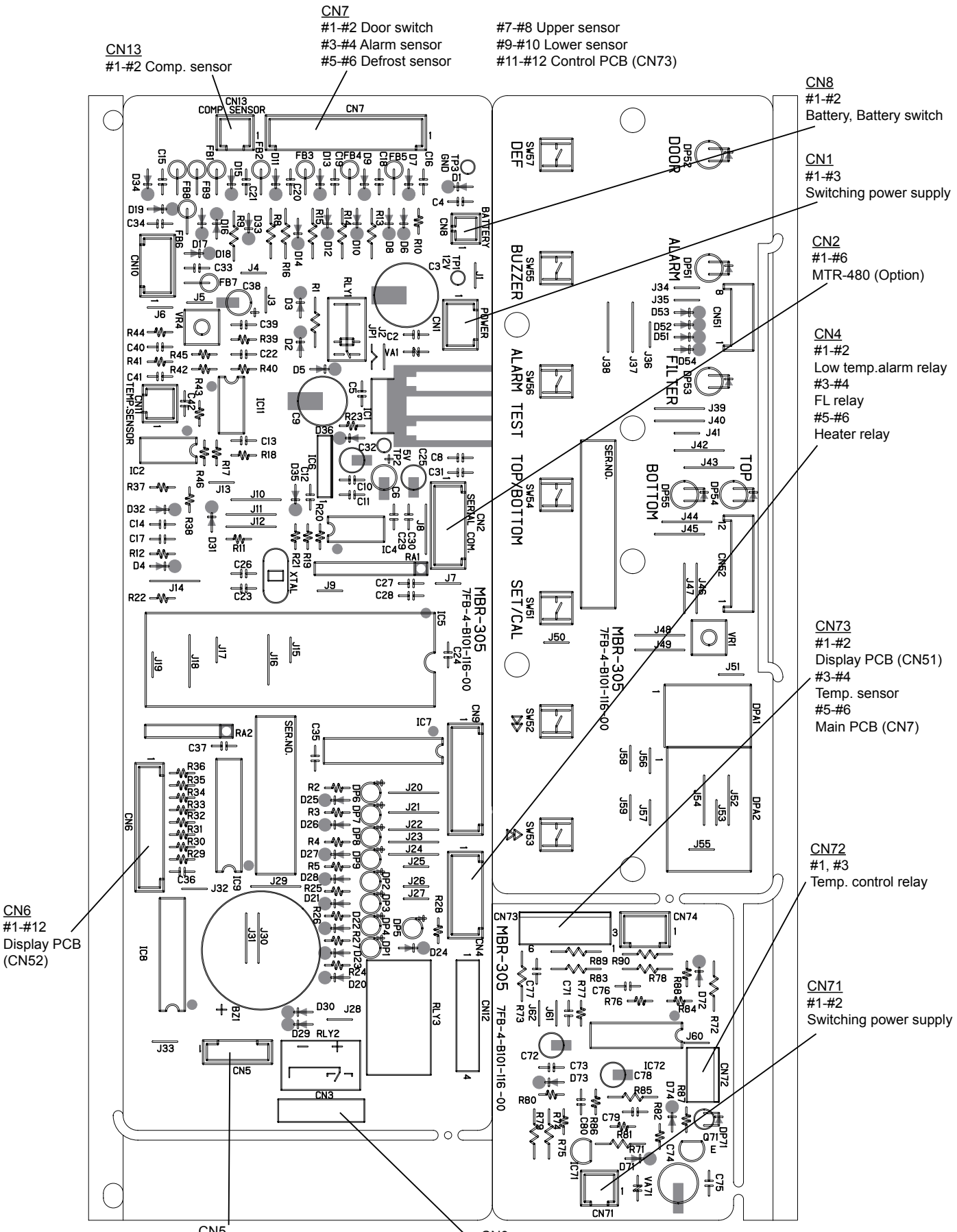
■Temperatures and references in thermistor（Type: 502AT-1）

Temperature (℃)	Resistance (kΩ)	Temperature (℃)	Resistance (kΩ)	Temperature (℃)	Resistance (kΩ)
-50	154.50	-7	17.92	12	8.17
-45	116.50	-6	17.16	13	7.85
-40	88.85	-5	16.43	14	7.55
-35	68.15	-4	15.74	15	7.27
-30	52.84	-3	15.08	16	6.99
-25	41.19	-2	14.45	17	6.73
-20	32.43	-1	13.86	18	6.48
-19	30.92	0	13.29	19	6.24
-18	29.50	1	12.74	20	6.01
-17	28.14	2	12.22	25	5.00
-16	26.87	3	11.72	30	4.18
-15	25.65	4	11.25	35	3.51
-14	24.51	5	10.80	40	2.96
-13	23.42	6	10.37	45	2.51
-12	22.39	7	9.96	50	2.14
-11	21.41	8	9.57	55	1.83
-10	20.48	9	9.20	60	1.57
-9	19.58	10	8.84		
-8	18.73	11	8.49		

■Temperatures and references in temp. sensor (Type:PT100Ω- NEW JIS)

Temp. (℃)	Resistance (Ω)	Temp. (℃)	Resistance (Ω)	Temp. (℃)	Resistance (Ω)	Temp. (℃)	Resistance (Ω)
-170	31.32	-100	60.25	-30	88.22	40	115.54
-160	35.79	-90	64.30	-20	92.16	50	119.40
-150	39.82	-80	68.33	-10	96.09	60	123.24
-140	43.87	-70	72.33	0	100.00	70	127.07
-130	48.00	-60	76.33	10	103.90	80	130.89
-120	52.11	-50	80.31	20	107.80	90	134.70
-110	56.19	-40	84.27	30	116.70	100	138.50

Components on PCB



Connections on PCB

■Connections on Main PCB

Connector	Connect to	Usage
CN1	Switching power supply #1: +12VDC #3: GND	To supply power to PCB
CN2	MTR-480 (Option)	
CN3	Remote alarm terminal #1: COM. #2: N.O. #3: N.C.	To output for remote alarm contact
CN4	#1 - #2: Low temp. alarm relay #3 - #4: FL relay #5 - #6: Heater relay	To operate low temp. cycle To link between FL. Lamp and door To supply power to main heater
CN5	#1 - #6: Display PCB (CN51)	To connect with each switch
CN6	#1 - #12: Display PCB (CN52)	To connect with each LED
CN7	#1 - #2 : Door switch #3 - #4 : Alarm sensor #5 - #6 : Defrost sensor #7 - #8 : Upper sensor #9 - #10 : Lower sensor #11 - #12 : Control PCB (CN73)	To detect door opening To detect low temp in chamber To detect frosting in chamber To detect upper bottle temperature To detect lower bottle temperature
CN8	#1 - #2: Battery, Battery switch	To control battery ON/OFF
CN13	#1 - #2: Comp. sensor	To detect fan motor lock

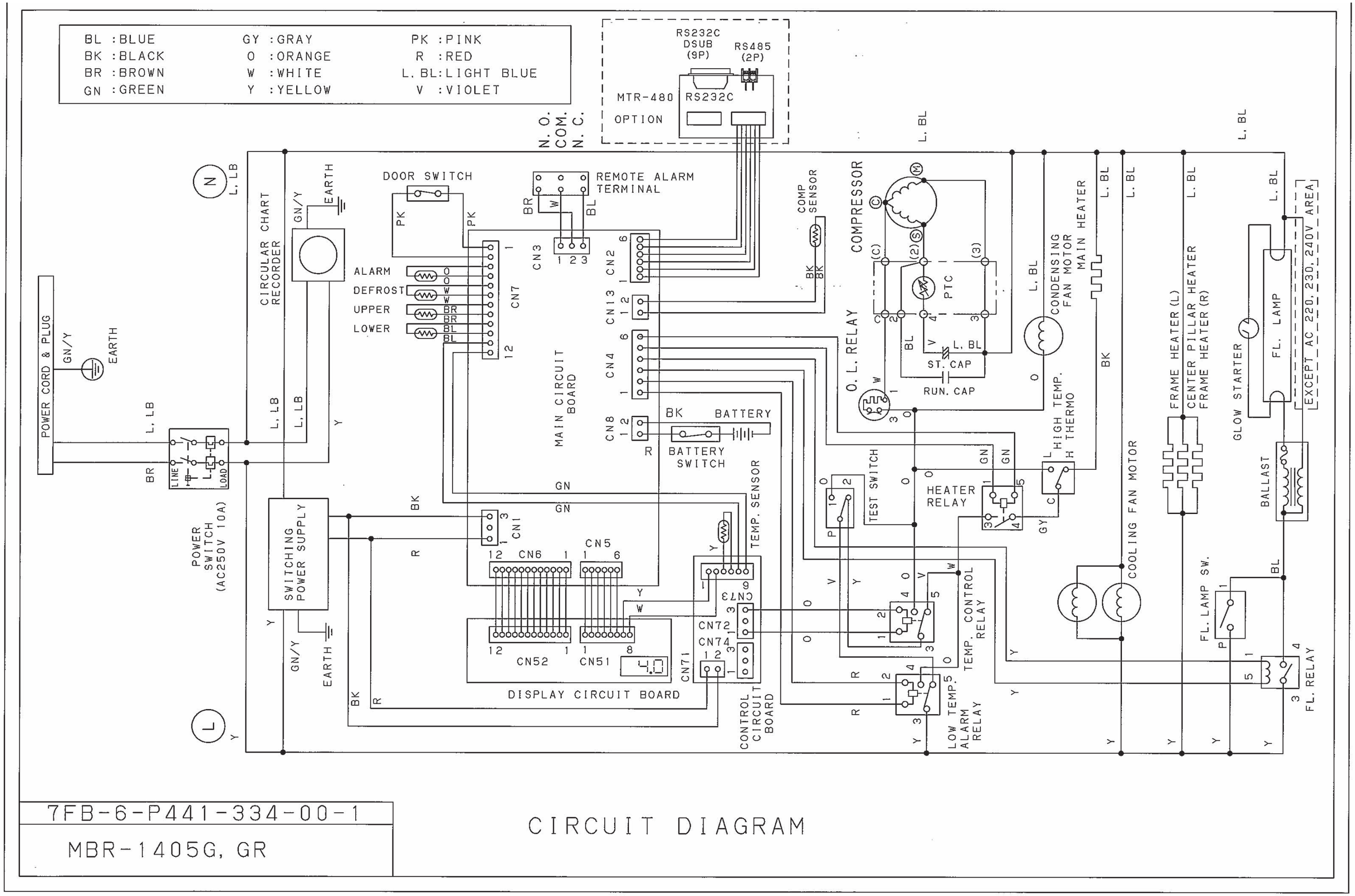
■Connections on Control PCB

Connector	Connect to	Usage
CN71	#1 - #2: Switching power supply	To supply power to PCB
CN72	#1 - #3: Temp. control relay	To control chamber temperature
CN73	#1 - #2: Display PCB (CN51) #3 - #4: Temp. sensor #5 - #6: Main PCB (CN7)	To detect chamber temperature

Electric Parts

MBR-1405G/1405GR		AC115V, 60Hz	AC220~240V, 50Hz
Compressor	Type	RL2557-PB	RL2557-SA
	Code	7FB-0-M101-008-02	7FB-0-M101-008-03
	Rated voltage (50/60Hz)	φ1, 110/115V, 60Hz	φ1, 220-240V, 50Hz
	Winding resistance C-R(Main)	1.32Ω	9.27Ω
	C-S(Aux)	6.41Ω	16.8Ω
PTC	Type	P6R0SAT	PGR0SAT
Overload relay	Type	5.6C36C1	2.8C36C1
	Action to the temp. (No current)		
	OFF	130+8/-9℃	130+8/-9℃
	ON	60+7/-5℃	60+7/-5℃
	Action to the current (AT25℃)	13.8A	9.6A
	Operation time	10±4 sec.	10±4 sec.
Starting capacitor	Rating	120μF 160VAC	60μF 300VAC
Running capacitor	Rating	20μF 260VAC	6μF 400VAC
Cooling fan motor	Type	FU2-B041C1MP	FU2-B041C5MP
	Rating	115VAC, 4W	220~240VAC, 4W
Condensing fan motor	Type	SE4-D041N1P	SE4-D041N5P
	Rating	115VAC, 4W	230VAC, 4W
Main heater	Rating	88W	88W
Frame heater(L)/(R)	Rating	7.9W	7.9W
Center pillar heater	Rating	32W	32W
Heater relay	Type	G2R-1A-T	G2R-1A-T
	Contact capacity	10A, 250V	10A, 250V
	Coil	12VDC	12VDC
Temp. control relay	Type	G4F-1123T	G4F-1123T
	Contact capacity	20A, 250V	20A, 250V
	Coil	12VDC	12VDC
Low temp. alarm relay	Type	G4F-1123T	G4F-1123T
	Contact capacity	20A, 250V	20A, 250V
	Coil	12VDC	12VDC
FL relay	Type	G2R-1A-T	G2R-1A-T
	Contact capacity	10A, 250V	10A, 250V
	Coil	12VDC	12VDC
High temp.thermo	Type	YTB-S391	YTB-S391
	Rating	ON:12℃ OFF:9℃	ON:12℃ OFF:9℃
Fluorescent lamp	Type	FL40SD	FL40SD
	Rating	40W	40W
Glow starter	Type	FG-4P	FG-4P
Ballast	Type	FLB-421722/23-C	FLB-421722/23-C
	Rating	40W, 230V, 50Hz	40W, 230V, 50Hz
Temp. sensor	Type	TRP-2-SP-REG	TRP-2-SP-REG
	Rating	PT100Ω	PT100Ω
Comp. sensor	Type	502AT	502AT
	Rating	5KΩ (25℃)	5KΩ (25℃)
Lower sensor	Type	502AT	502AT
	Rating	5KΩ (25℃)	5KΩ (25℃)
Upper sensor	Type	502AT	502AT
	Rating	5KΩ (25℃)	5KΩ (25℃)
Defrost sensor	Type	502AT	502AT
	Rating	5KΩ (25℃)	5KΩ (25℃)
Alarm sensor	Type	502AT	502AT
	Rating	5KΩ (25℃)	5KΩ (25℃)
Switching power supply	Type	ZWS10-12/J	ZWS10-12/J
	Rating	DC12V, 0.85A	DC12V, 0.85A
Battery switch	Type	HLS112D	HLS112D
	Rating	6A, 250VAC	6A, 250VAC
Battery	Type	5HR-AAC	5HR-AAC
	Rating	6V, 1100MAH	6V, 1100MAH
Power switch	Type	BAM210131	BAM210131
	Rating	250V, 10A	250V, 10A
Door switch	Type	SS160-A15	SS160-A15
	Rating	28V, 50MA	28V, 50MA
FL lamp switch	Type	MS152W1-A01	MS152W1-A01
	Rating	DC8V, 1A	DC8V, 1A
Test switch	Type	SLE6D2-5	SLE6D2-5
	Rating	4A, 250VAC	4A, 250VAC

Wiring diagram



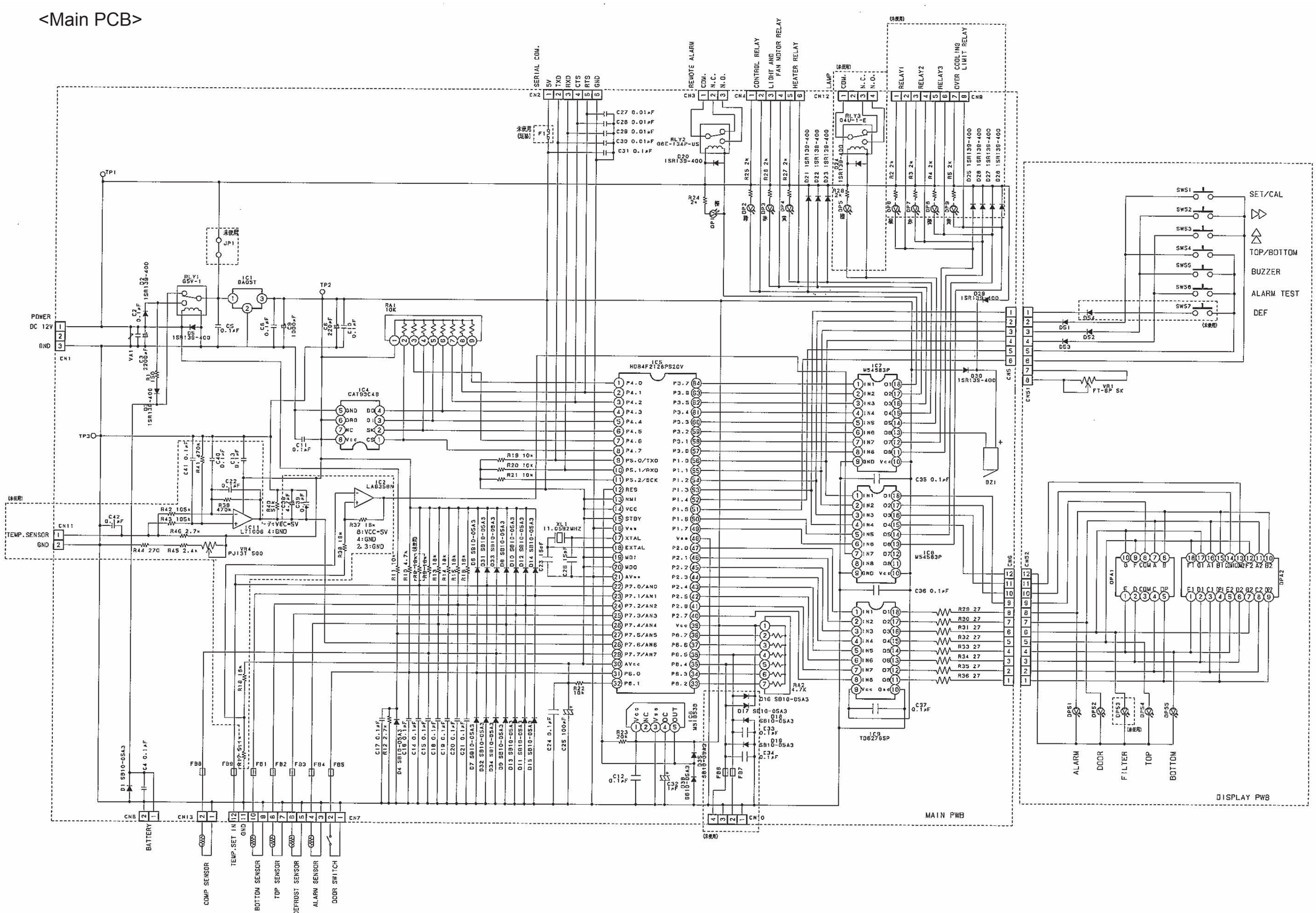
7FB-6-P441-334-00-1

MBR-1405G, GR

CIRCUIT DIAGRAM

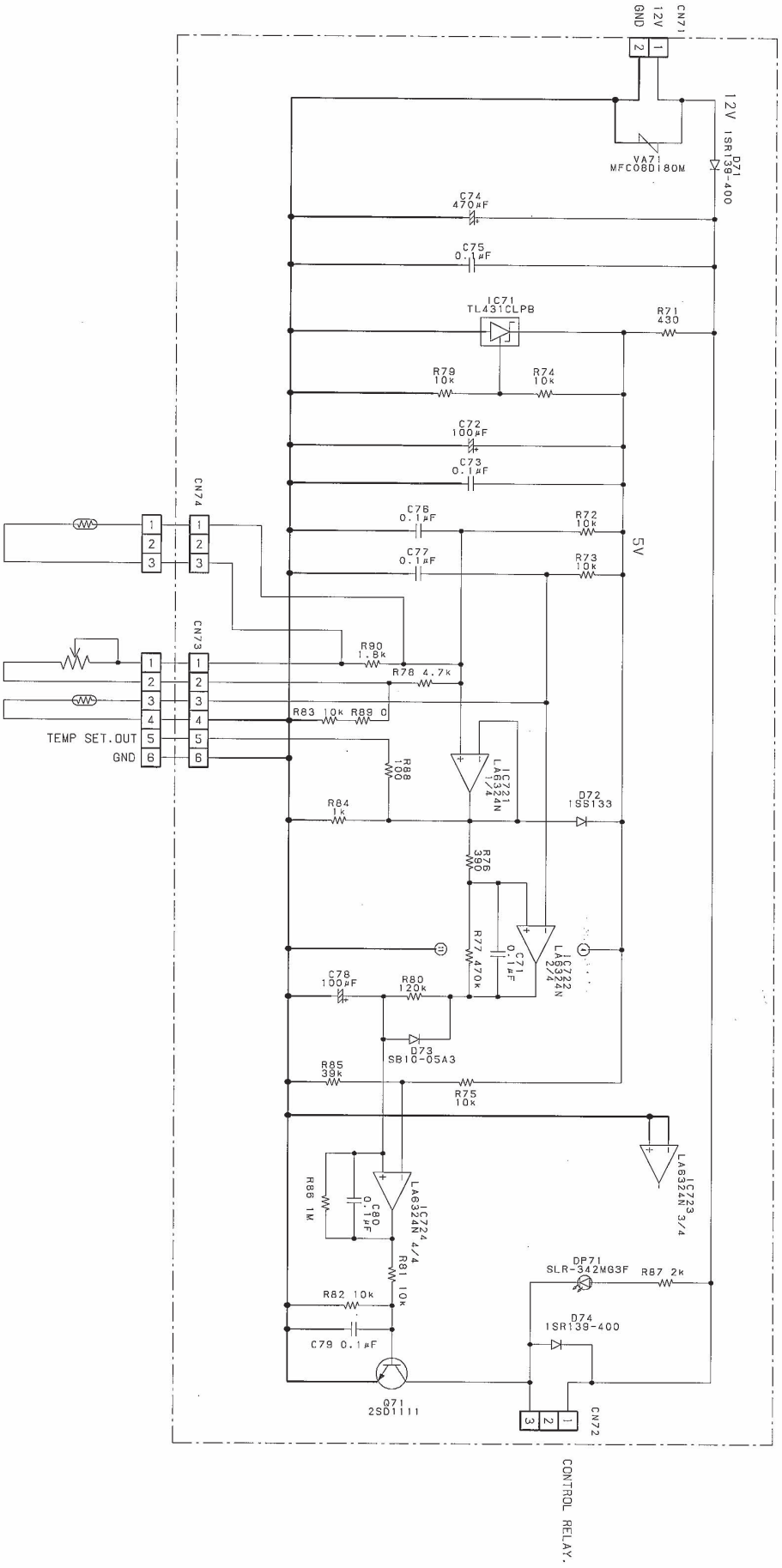
Circuit diagram

<Main PCB>



Circuit Diagram

<Control PCB>



Control specifications

1. Keys on control panel

BUZZER : When a unit is in alarming condition, press this key to stop audible alarm sounding and to turn remote alarm off.
Alarm message remains to display.
This key is inoperative during an alarm test performs.

UPPER/LOWER : Display temperature is changed to the following order by every time pressing this key.
Mean temp. (Factory default) => Upper bottle temp. => Lower bottle temp. => Mean temp. ...

ALARM TEST : Press this key to perform an alarm test.
ALARM lamp blinks, audible alarm sounds and remote alarm contact turns on.
If there are no key operations for 90 seconds, a unit has alarm test come to the end.
If this key is pressed during alarm test performs, a unit has alarm test come to the end.
This key is inoperative when a unit is actually in alarming condition.

SET/CAL : Press this key for 5 seconds to step to calibration mode (C-mode).
This key acts as 'Enter key' during a unit is in C-mode or function mode (F-mode).

▶▶ (Scroll key) : This key is used in C-mode and F-mode. Press this key to shift digit to be changed.

▲ (Up arrow key): This key is used in C-mode and F-mode. Press this key to change numerical value.

2. Temperature setting and function

(1) Temperature setting

Setting range: +2.5 ~ +9.0℃ (Turn a volume on control panel)

How to set: Step to F-mode, 'F38' to display setting temperature in control PCB.
Turn a volume, 'VR1' to set temperature.
Press SET/CAL key to return to chamber temperature display.

Ex.) If a measured temperature will be set to 4.0℃ when it is actually 3.6℃ while a display temperature in F38 is '4.0', turn 'VR1' until the display temperature will be '4.4'.

Note) If you turn VR1 without displaying control PCB temperature, it may be caused to change temperature setting.

(2) Function mode (F-mode)

Setting range: 0 ~ 45

Display range: 0 ~ 49
(05, 07, 08, 10, 18~20, 23, 24, 26~29, 31, 39~42, 46~49 are unused.)

How to set: In chamber temperature display, press ▲▲ key for 5 seconds to step to function mode and 'F00' is displayed with 1st digit blinks.
Change a value by pressing ▲▲ key and ▶▶ key.
Press SET/CAL key to activate function mode.

Unacceptable setting range: If a value which is out of setting range is input and SET/CAL key is pressed, error tone emits and setting will not be changed.

(3) Calibration mode (C-mode)

Setting range: 0 ~ 4

Display range: 0 ~ 4

How to set: In chamber temperature display, press ▲▲ key for 5 seconds to step to calibration mode and 'C00' is displayed with 1st digit blinks.
Change a value by pressing ▲▲ key and ▶▶ key.
Press SET/CAL key to activate calibration mode.

Unacceptable setting range: If a value which is out of setting range is input and SET/CAL key is pressed, error tone emits and setting will not be changed.

3. Error codes and Notice

E03: Defrost sensor is open circuited
E04: Defrost sensor is short circuited
E05: Comp. sensor is open circuited
E06: Comp. sensor is short circuited
E10: Compressor temperature is abnormal
E13: Alarm sensor is open circuited
E14: Alarm sensor is short circuited
E15: Upper sensor is open circuited
E16: Upper sensor is short circuited
E17: Lower sensor is open circuited
E18: Lower sensor is short circuited
E2P: Unit fails to write data in non-volatile memory
F-1: Notice of battery life
F-2: Notice of condensing fan motor life

Following shows the descriptions of error codes and notices.

E03: When a temperature in defrost sensor is lower than -60℃, a unit diagnoses that the sensor is open circuited and 'E03' and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
At the time the unit does not perform defrosting.
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E03 emits.

E04: When a temperature in defrost sensor is higher than +60℃, a unit diagnoses that the sensor is short circuited and ‘E04’ and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
At the time the unit does not perform defrosting.
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E04 emits.

E05: When a temperature in comp. sensor is lower than -60℃, a unit diagnoses that the sensor is open circuited and ‘E05’ and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E05 emits.

E06: When a temperature in comp. sensor is higher than +130℃, a unit diagnoses that the sensor is short circuited and ‘E06’ and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E06 emits.

E10: When a temperature in comp. sensor is higher than +50℃, a unit diagnoses that fan motor is locked.
E10’ and chamber temperature are displayed alternately, and both compressor and heater are turned off.
At the time audible alarm and remote alarm do not activate.
Compressor and heater turn on as soon as a temperature in comp. sensor will be lower than 40℃.

E13: When a temperature in alarm sensor is lower than -60℃, a unit diagnoses that the sensor is open circuited, and ‘E13’ and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
Temperature alarm is controlled by chamber temperature (temperature in upper/lower sensor).
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E13 emits.

E14: When a temperature in alarm sensor is higher than +60℃, a unit diagnoses that the sensor is short circuited, and ‘E14’ and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
Temperature alarm is controlled by chamber temperature (temperature in upper/lower sensor).
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E14 emits.

E15: When a temperature in upper sensor is lower than -60℃, a unit diagnoses that the sensor is open circuited, and ‘E15’ and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
At the time a unit cannot detect high and low temperature alarm.
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E15 emits.

E16: When a temperature in upper sensor is higher than +60℃, a unit diagnoses that the sensor is short circuited, and 'E16' and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
At the time a unit cannot detect high and low temperature alarm.
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E16 emits.

E17: When a temperature in lower sensor is lower than -60℃, a unit diagnoses that the sensor is open circuited, and 'E17' and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
At the time a unit cannot detect high and low temperature alarm.
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E17 emits.

E18: When a temperature in lower sensor is higher than +60℃, a unit diagnoses that the sensor is short circuited, and 'E18' and chamber temperature are displayed alternately. Audible alarm sounds and remote alarm activates.
At the time a unit cannot detect high and low temperature alarm.
By pressing BUZZER key to cancel operations for audible alarm and remote alarm when E18 emits.

E2P: When a unit fails to write data in non-volatile memory, 'E2P' and chamber temperature are displayed alternately.
Audible alarm and remote alarm do not activate.

F-1: When battery accumulation time, about 2.8 years (1022days) expires, 'F-1' and chamber temperature are alternately displayed.
Unit starts counting accumulation time every 24 hours elapse since a power is supplied.
Audible alarm and remote alarm do not activate.
Input '409' in F06 and press SET/CAL key to reset accumulation time to '0'.
If a unit forcibly turns off before 24 hours elapse since the power supplied, it is ineffective for counting accumulation time until 24 hours elapse.

F-2: When condensing fan motor accumulation time, about 5.6 years (2044days) expires, 'F-2' and chamber temperature are alternately displayed.
Unit starts counting accumulation time every 24 hours elapse since a power is supplied.
Audible alarm and remote alarm do not activate.
Input '410' in F06 and press SET/CAL key to reset accumulation time to '0'.
If a unit forcibly turns off before 24 hours elapse since the power supplied, it is ineffective for counting accumulation time until 24 hours elapse.
Note) If notice of fan motor life is set to '0' (Not notify) in F43, 'F-2' will not emit.

Error code priority:

High

Low

E03/E04 (Open/short circuit in defrost sensor)
E05/E06 (Open/short circuit in comp. sensor)
E10 (Compressor temperature is abnormal)
E13/E14 (Open/short circuit in alarm sensor)
E15/E16 (Disable to detect high/low temp. alarm)
E17/E18 (Disable to detect high/low temp. alarm)
E2P (Disable to memorize setting value)
F-1 (Notice of battery life)
F-2 (Notice of condensing fan motor life)

4. Alarms

High temp. alarm:

When one of bottle temperature which is higher than the other between upper and lower bottle is equal or higher than SV_H (high temp. alarm set temperature) + 0.09, ALARM lamp and LED digits blink, audible alarm sounds intermittently, remote alarm turns on.
When one of bottle temperature which is higher than the other between upper and lower bottle is equal or lower than SV_H, ALARM lamp goes off, LED digits stops blinking, audible alarm silences, remote alarm turns off.
Press BUZZER key to cancel operations for audible alarm and remote alarm during unit is in alarming condition.
High temp. alarm setting temperature is changeable in F01.
(Factory default: 6℃)

Low temp. alarm:

When one of bottle temperature which is lower than the other between upper and lower bottle is lower than SV_L (low temp. alarm set temperature) -0.09, ALARM lamp and LED digits blink, audible alarm sounds intermittently, remote alarm turns on.
When one of bottle temperature which is lower than the other between upper and lower bottle is equal or higher than SV_L, ALARM lamp goes off, LED digits stops blinking, audible alarm silences, remote alarm turns off.
Press BUZZER key to cancel operations for audible alarm and remote alarm during unit is in alarming condition.
Low temp. alarm setting temperature is changeable in F02.
(Factory default: 2℃)

Door alarm:

When a door leaves open, DOOR lamp illuminates and audible alarm sounds intermittently after delay time elapses. Audible alarm does not link with remote alarm. Press BUZZER key to cancel an operation for audible alarm. (Ring Back does not activate).

Power failure alarm:

When a power switch is in off position or a power is interrupted, ALARM lamp blinks, LED digits go off, audible alarm sounds intermittently, remote alarm turns on.
Operations for audible alarm and remote alarm are not cancelled by pressing BUZZER key.
Unit will start an operation with initial setting after it returns from a power failure. Remote alarm will not turn on.

5. Representative functions

Auto Return:	If there are no key operations for 90 seconds during calibration mode and function mode, unit will automatically return to chamber temperature display.
Ring Back:	Audible alarm will sound again after predetermined setting time elapses if BUZZER key is pressed to cancel operation for audible alarm. Ring Back time is changeable in F25. (Factory default: 30 minutes)
Example display of sensor temperature:	When upper sensor temp. is +5.4℃ => Display indicates as '5.4' When lower sensor temp. is -5.4℃ => Display indicates as '-5.4' When lower sensor temp. is -20.3℃ => Display indicates as '20.3' When defrost sensor temp. is -5.4℃ => Display indicates as '-5.4' When defrost sensor temp. is -20.3℃ => Display indicates as '20.3' When comp. sensor temp. is +36.2℃ => Display indicates as '36.2' When alarm sensor temp. is +5.4℃ => Display indicates as '05.4' Note) When comp. sensor temp. is higher than 99.9℃, display will indicate as '99.9'.
Battery accumulation time:	Battery accumulation time is displayed in F03. When battery accumulation time is 2.5 years, display indicates as '02.5' When battery accumulation time (about 3 years) expires, 'F-1' is displayed. Input '409' and press SET/CAL key to reset non-volatile memory to '00.0'.
Condensing fan motor accumulation time:	Condensing fan motor accumulation time is displayed in F32. When condensing fan motor accumulation time is 5.3 years, display indicates as '05.3'. When notice of fan motor life is selected to '001' (notify) in F43 and accumulation time (about 6 years) expires, 'F-2' is displayed. Input '410' and press SETS/CAL key to reset non-volatile memory to '00.0'.
Display of ROM version:	Installed ROM version can be checked in F30. When a ROM version is 1.00, display indicates as '1.00'.

6. Function mode (F-mode)

F01: Setting of high temp. alarm
F02: Setting of low temp. alarm
F03: Display of battery accumulation time
F04: Setting of door alarm delay time
F06: Input of service code, Reset of accumulation time
F09: Compressor continuous running mode (Unused)
F11: PCB test mode (Unused)
F12: Display of upper sensor temperature
F13: Display of lower sensor temperature
F14: Display of defrost sensor temperature
F15: Display of comp. sensor temperature
F16: Display of alarm sensor temperature
F17: Setting of model code, Data initialization in non-volatile memory
F21: Setting of communication ID
F22: Setting of communication mode
F25: Setting of Ring Back time
F30: Display of ROM version
F32: Display of condensing fan motor accumulation time
F33: Setting of temperature to start defrosting
F34: Setting of temperature to terminate defrosting
F35: Defrost operation check mode (Unused)
F36: Display of frequency of defrosting
F37: High temp. alarm operation check (Unused)
F38: Display of setting temperature
F43: Notice of condensing fan motor life
F44: Setting of temperature for low temp. cycle
F45: Linkage between door and illumination

How to set: (1) Press ▲▲ key for 5 seconds in chamber temperature is displayed.
(2) 'F00' is displayed. Input function code by pressing ▲▲ key and ▶▶ key.
(3) Press SET/CAL key to step to required function mode.

F01: [Purpose] Setting of high temp. alarm
[Operation] Input 'F01' and press SET/CAL key to display '06.0' (Factory default).
Input required value by pressing ▲▲ key and ▶▶ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.
(Range: 05.0 ~ 09.9)

F02: [Purpose] Setting of low temp. alarm
[Operation] Input 'F02' and press SET/CAL key to display '02.0' (Factory default).
Input required value by pressing ▲▲ key and ▶▶ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.
(Range: 01.0 ~ 04.0)

F03: [Purpose] Display of battery accumulation time
[Operation] Input 'F03' and press SET/CAL key to display alternately F03 with battery accmulation time. Press SET/CAL key to return to chamber temperature display.
Note) If accmulation time is less than 36days, '00.0' will be displayed.

F04: [Purpose] Setting of door alarm delay time
[Operation] Input F04 and press SET/CAL key to display '002' (Factory default).
Change to requried value by pressing ▲ key and ▶▶ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.
(Range: 001~ 012)

F06: [Purpose] Input of service code, reset of accumulation time
[Operation] Input 'F06' and press SET/CAL key to display '000' (Factory default).
[Reset] Battery accumulation time:
Change a value to '409' by pressing ▲ key and ▶▶ key.
Press SET/CAL key to reset battery accumulation time and unit will return to chamber temperature display.
Condensing fan motor accumulation time:
Change a value to '410' by pressing ▲ key and ▶▶ key.
Press SET/CAL key to reset condensing fan motor accumulation time and unit will return to chamber temperature display.

F12: [Purpose] Display of upper sensor temperature
[Operation] Input 'F12' and press SET/CAL key to display 'F12' alternately with current upper sensor temperature.
[Cancel] In 'F12' displays alternately with current upper sensor temperature, press SET/CAL key to return to chamber temperature display.

F13: [Purpose] Display of lower sensor temperature
[Operation] Input 'F13' and press SET/CAL key to display 'F13' alternately with current lower sensor temperature.
[Cancel] In 'F13' displays alternately with current lower sensor temperature, press SET/CAL key to return to chamber temperature display.

F14: [Purpose] Display of defrost sensor temperature
[Operation] Input 'F14' and press SET/CAL key to display 'F14' alternately with current defrost sensor temperature.
(Ex.) -22.5℃ => Displayed as '22.5'
[Cancel] In 'F14' displays alternately with current defrost sensor temperature, press SET/CAL key to return to chamber temperature display.

F15: [Purpose] Display of comp. sensor temperature
[Operation] Input 'F15' and press SET/CAL key to display 'F15' alternately with current comp. sensor temperature.
(Ex.) 120.0℃ => Displayed as '99.9'
Note) When comp. sensor temp. is higher than 99.9℃, display will indicate as '99.9'.
[Cancel] In 'F15' displays alternately with current comp. sensor temperature, press SET/CAL key to return to chamber temperature display.

F16: [Purpose] Display of alarm sensor temperature
[Operation] Input 'F16' and press SET/CAL key to display 'F16' alternately with current alarm sensor temperature.
[Cancel] In 'F16' displays alternately with current alarm sensor temperature, press SET/CAL key to return to chamber temperature display.

F17: [Purpose] Setting of model code, data initialization in non-volatile memory
[Operation] Input 'F17' and press SET/CAL key to display current model code.
Change to '001' (Model code for MBR-1405G/1405GR) by pressing ▲ key and ▶▶ key.
Press SET/CAL key to memorize the value in non-volatile memory and unit will return to chamber temperature display.

Note) It is necessary to set model code when PCB is replaced.

[Initial values in non-volatile memory]

Zero adjustment for upper sensor	: 000
Zero adjustment for lower sensor	: 000
Temperature to start defrosting	: -10℃
Temperature to terminate defrosting	: 5℃
Temperature for low temp cycle	: 2℃
Linkage between door and illumination	: 0 (Not linked)
High temp. alarm temperature	: 6℃
Low temp. alarm temperature	: 2℃
Door alarm delay time	: 2 minutes
Span adjustment for upper sensor	: 100
Span adjustment for lower sensor	: 100
Ring Back time	: 30 minutes
Communication ID	: 000
Communication mode	: 000
Non-volatile memory check data	:
Battery accumulation time	: 0
Condensing fan motor accumulation time	: 0
Notice of condensing fan motor life	: OFF

F21: [Purpose] Setting of serial communication ID
[Operation] Input 'F21' and press SET/CAL key to display '000' (Factory default).
Change a value by pressing ▲ key and ▶▶ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.
(Range: '001' ~ '255')

[Serial communication data]

Mean between upper and lower sensor temp.	: -60.0 ~ +60.0 (℃)
Upper sensor temperature	: -60.0 ~ +60.0 (℃)
Lower sensor temperature	: -60.0 ~ +60.0 (℃)
Defrost sensor temperature	: -60.0 ~ +60.0 (℃)
Power failure	: 0/100 (Yes/No)
Comp. sensor temperature	: -60.0 ~ +60.0 (℃)
Door status	: 0/100 (Open/Close)
Set temp. for temp. control PCB	: -60.0 ~ +60.0 (℃)
Alarm sensor temperature	: -60.0 ~ +60.0 (℃)
High temp. alarm set temperature	: 5.0 ~ 9.9 (℃)
Low temp. alarm set temperature	: 1.0 ~ 4.0 (℃)

F22: [Purpose] Setting of serial communication mode
[Operation] Input 'F22' and press SET/CAL key to display '000' (Factory default).
Change a value by pressing ▲ key and ▶▶ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.

Control mode (The 3rd digit)	0: Local (Factory default)
	1: Remote
Baud rate (The 2nd digit)	0: 2400 bps (Factory default)
	1: 4800 bps
	2: 9600 bps

F25: [Purpose] Setting of Ring Back time
[Operation] Input 'F25' and press SET/CAL key to display '030' (Factory default).
Change a value by pressing ▲ key and ▶▶ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.
(Range: '010' ~ '099')

F30: [Purpose] Display of ROM version
[Operation] Input 'F30' and press SET/CAL key to display F30 alternately with 'X.XX' (current ROM version).
Press SET/CAL key to return to chamber temperature display.

F32: [Purpose] Display of condensing fan motor accumulation time
[Operation] Input 'F32' and press SET/CAL key to display F32 alternately with 'XX.X' (condensing fan motor accumulation time).
Press SET/CAL key to return to chamber temperature display.
Note) If an accumulation time is less than 36days, '00.0' will be displayed.

F33: [Purpose] Setting of temperature to start defrosting
[Operation] Input 'F33' and press SET/CAL key to display '-10.0' (Factory default). Change a value by pressing ▲ key and ▶▶ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.
(Range: '-10.0' ~ '-19.9')

F34: [Purpose] Setting of temperature to terminate defrosting
[Operation] Input 'F34' and press SET/CAL key to display '05.0' (Factory default).
Change a value by pressing ▲ key and ▶▶ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.
(Range: '0.0' ~ '9.9')

F36: [Purpose] Display of frequency of defrosting
[Operation] Input 'F36' and press SET/CAL key to display F36 alternately with frequency of defrosting (Maximum: 999) that has been counted since a power was supplied.
Turn the power off or press ▲ key over 5 seconds to reset counting.
[Reset] When F36 and frequency of defrosting are alternately displayed, press SET/CAL key to return to chamber temperature display.

F38: [Purpose] Display of setting temperature
[Operation] Input 'F38' and press SET/CAL key to display F38 alternately with 'XX.X' (setting temperature). Press SET/CAL key to return to chamber temperature display.
[Reset] When F38 and setting temperature are alternately displayed, press SET/CAL key to return to chamber temperature display.

F43: [Purpose] Notice of condensing fan motor life
[Operation] Input 'F43' and press SET/CAL key to display '000' or '001'.
Change to alternate value by pressing ▲ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.
000: Not notify
001: Notify

F44: [Purpose] Setting of temperature for low temp. cycle
[Operation] Input 'F44' and press SET/CAL key to display '02.0' (Factory default).
Change a value by pressing ▲ key and ▶▶ key.
Press SET/CAL key to memorize the value and unit will return to chamber temperature display.
(Range: '000' ~ '030')

F45: [Purpose] Linkage between door and illumination
[Operation] Input 'F45' and press SET/CAL key to display '000' (Factory default).
Change a value by pressing ▲ key and ▶▶ key.
Press SET/Cal key to memorize the value and unit will return to chamber temperature display.
0 (1st digit): Not linked
1 (1st digit): Linked

7. Calibration mode (C-mode)

C00: Unit will return to chamber temperature display (Unused)
C01: Zero calibration of upper sensor
C02: Zero calibration of lower sensor
C03: Span calibration of upper sensor
C04: Span calibration of lower sensor

How to set: (1) When a chamber temperature displays, press SET/CAL key for 5 seconds
(2) 'C00' will be displayed.
Input calibration code by pressing ▲ key and ▶▶ key.
(3) Press SET/CAL key to activate calibration mode.

C01: [Purpose] Zero calibration of upper sensor

[Operation] Press TOP/BOTTOM key to display upper sensor temperature (Range: -1.5~+1.5℃). If upper sensor temperature is out of range, unit will not commance calibration and audible alarm will sound.
Put upper sensor into fully stirred ice water and leave it until temperature display stabilizes.
Press SET/CAL key for 5 seconds to display 'C00'.
Change to 'C01' by pressing ▲▲ key.
Press SET/CAL key to terminate calibration and to return to chamber temperature display.

Note) Ensure to repeat the procedure until a displayed temperature should be almost 0℃.

C02: [Purpose] Zero calibration of lower sensor

[Operation] Press TOP/BOTTOM key to display lower sensor temperature (Range: -1.5~+1.5℃). If lower sensor temperature is out of range, unit will not commance calibration and audible alarm will sound for 1 second.
Put upper sensor into fully stirred ice water and leave it until temperature display stabilizes.
Press SET/CAL key for 5 seconds to display 'C00'.
Change to 'C02' by pressing ▲▲ key.
Press SET/CAL key to terminate calibration and to return to chamber temperature display.

Note) Ensure to repeat the procedure until a displayed temperature should be almost 0℃.

C03: [Purpose] Span calibration of upper sensor

[Operation] Press SET/CAL key for 5 seconds to display 'C00'.
Change to 'C03' by pressing ▲▲ key.
Press SET/CAL key to display lower sensor temperature.
Change to a correct value by pressing ▲▲ key and ▶▶ key.
(Range: +3.0 ~ +5.9℃)
If a value deviates from the range, unit will not commance calibration and audible alarm will sound for 1 second.
Press SET/CAL key to terminate calibration and to return to chamber temperature display.

C04: [Purpose] Span calibration of lower sensor

[Operation] Press SET/CAL key for 5 seconds to display 'C00'.
Change to 'C03' by pressing ▲▲ key.
Press SET/CAL key to display lower sensor temperature.
Change to a correct value by pressing ▲▲ key and ▶▶ key.
(Range: +3.0 ~ +5.9℃)
If a value deviates from the range, unit will not commance calibration and audible alarm will sound for 1 second.
Press SET/CAL key to terminate calibration and to return to chamber temperature display.

8. Temperature control

(1) Low temperature cycle
When alarm sensor temperature is lower than +2℃, alarm relay will turn on.
(Compressor will turn off and heater will be energized)
When alarm sensor temperature is higher than +2℃, alarm relay will turn off.
(Compressor and heater will be controlled by temperature control PCB)
Setting temperature for low temp. cycle is changeable in F44.

There is 3 minutes for compressor delay time, so compressor will not turn on for 3 minutes after the power is supplied, even if it meets condition that compressor should turn on.

(2) When alarm sensor fails during low temperature cycle
Upper/lower sensor will be used instead of alarm sensor.
When low temp. alarm occurs, alarm relay will turn on.
(Compressor will turn off and heater will be energized)
When low temp. alarm is cancelled, alarm relay will turn off.
(Compressor and heater will be controlled by temperature control PCB)

(3) Compressor protection
When condensing fan motor is locked, compressor will turn off to prevent discharge pressure in compressor from being increased.
When comp. sensor temperature is higher than +50℃, compressor will turn off.
When comp. sensor temperature is lower than +40℃, compressor will turn on.

9. Defrosting

A unit will defrost around evaporator by turning compressor off and energizing heater which were controlled by a defrost sensor temperature in evaporating pipe.
During defrost, a unit will display ‘dF’ alternately with chamber temperature.

(1) Forced defrosting
When a defrost sensor temperature is lower than -12℃ (Factory default), a unit will force to defrost.
When a defrost sensor temperature is higher than +5℃ (Factory default) during defrost, a unit will terminate defrosting.
A temperature that commances defrosting is changeable in F33.
A temperature that terminates defrosting is changeable in F34.

(2) Count of frequency of defrost
Count will be checked in F36.

10. Delay time

(1) Compressor delay time (3 minutes, fixed)
When a unit cycled runs, there is 3 minutes delay to turn on compressor again after it is turned off.
There are no delay after a unit turns off and on (Power on reset).

(2) Door alarm delay time (2 minutes, factory default)
There is delay time to sound audible alarm when a door leaves open.
Delay time is changeable in F04.

11. Remote alarm contact

	CN3	
	Between #1 (COM.)and #2 (N.O.)	Between #1 (COM.)and #3 (N.C.)
Normal	Open	Close
In alarm	Close	Open

12. Settings after a power is supplied (Power on reset)

Alarms : OFF
Compressor : OFF
Defrosting : OFF
Compressor protection : OFF
Remote alarm : OFF
Ring Back : OFF
Door alarm delay time : 2 minutes
Timer : Reset
Setting data : Read by non-volatile memory

13. Lamp operation

(1) Display PCB
DP51: (ALARM) Red lamp blinks when a unit is in alarming condition.
DP52: (DOOR) Red lamp illuminates when a door leaves open.
DP54: (Upper limit temperature)
Green lamp illuminates when upper sensor temperature is displayed.
DP55: (Lower limit temperature)
Green lamp illuminates when lower sensor temperature is displayed.

(2) Main PCB

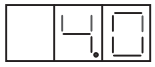
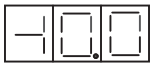
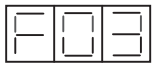
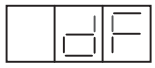
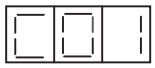
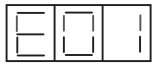
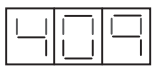
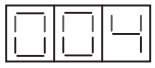
DP1: (Alarming operation)
Orange lamp illuminates when a unit is not in alarming condition.
Orange lamp goes off when high/low temp. alarm occurs or sensor fails.

DP2: (Temperature control)
Green lamp illuminates when a compressor turns off.
Green lamp goes off when a temp. control PCB is in control.

DP3: (Illumination)
Red lamp illuminates when fluorescent lamp illuminates.
Red lamp goes off when fluorescent lamp goes off.

DP4: (Heater operation)
Yellow lamp illuminates when defrost heater turns on.
Yellow lamp goes off when defrost heater turns off.

14. Examples of LED display

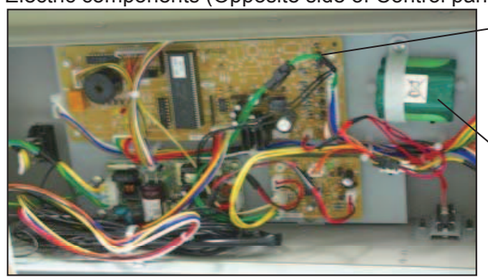
Chamber temp.	4.0℃		Temp. to start defrosting	-10.0	
Function mode	F03		Forcible defrosting	dF	
Calibration mode	C01		Error code	E01	
Service code	409		Battery life	F-1	
Setting value	004				

15. Buzzer tone

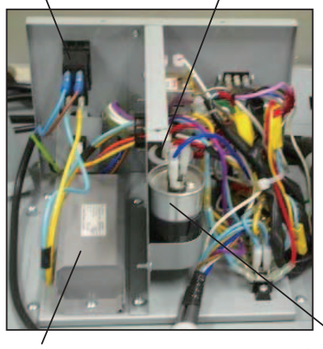
Alarms	: Intermittent tone
Key operation	: Short tone
Set value memorization	: Short tone
Out of setting range	: 1 second alarming tone
Power failure	: intermittent tone

Parts layout

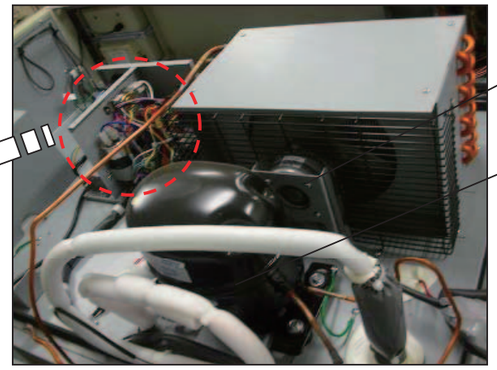
Electric components (Opposite side of Control panel)



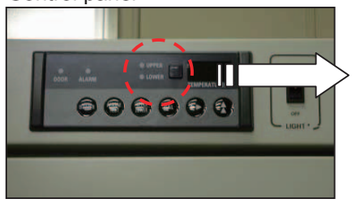
Power switch
Starting capacitor



Cooling unit (Ceil)



Control panel



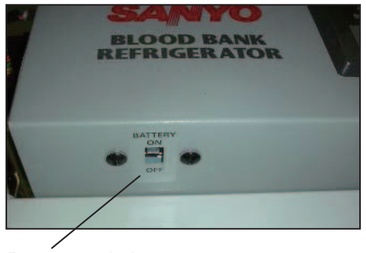
Volume for temperature control

Control panel
Temperature recorder

Temperature recorder

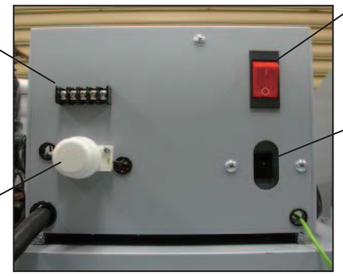
Opposite side of Temperature recorder

Bottom at Front cover

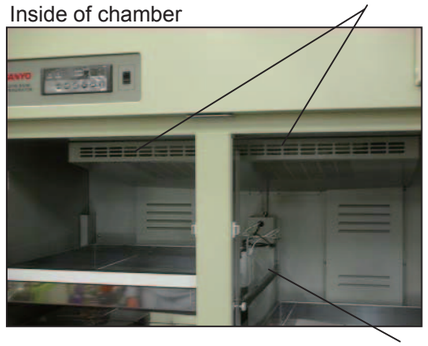


Battery switch

Front cover is removed
Power switch
Remote alarm terminal
Test switch
Glow starter



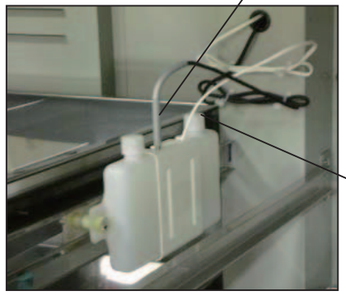
Cover for cooling fan
Inside of chamber



Upper bottle

Lower sensor

Sensor for Temp. recorder
Upper sensor

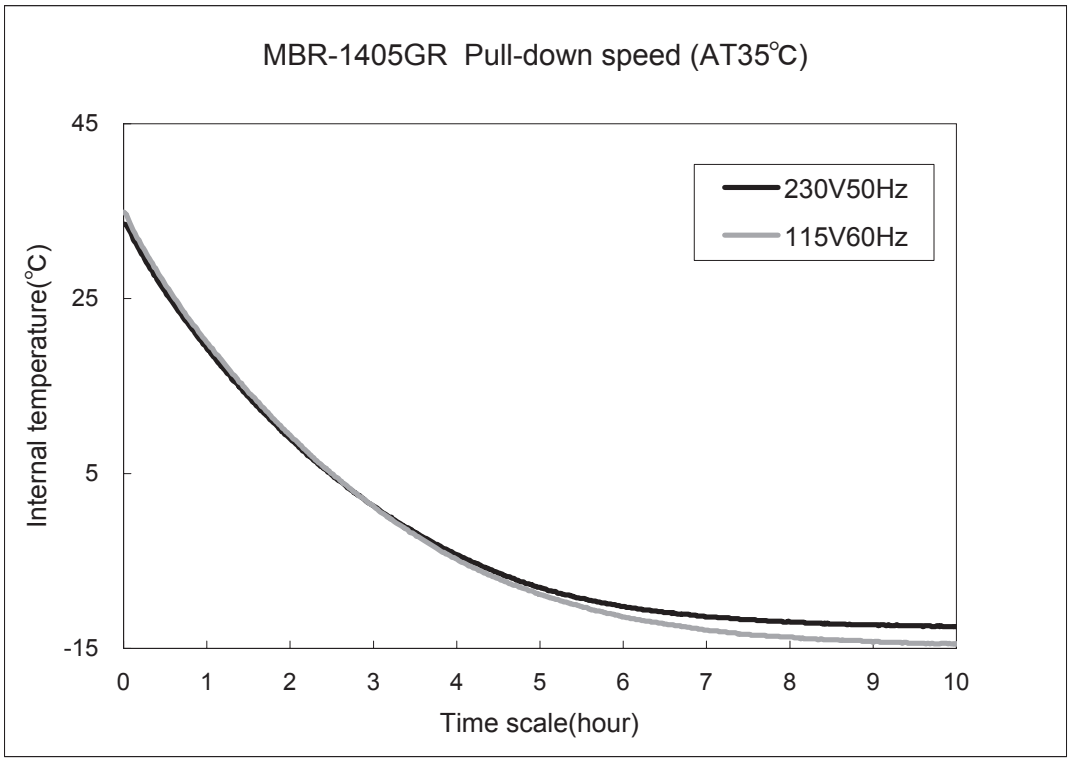


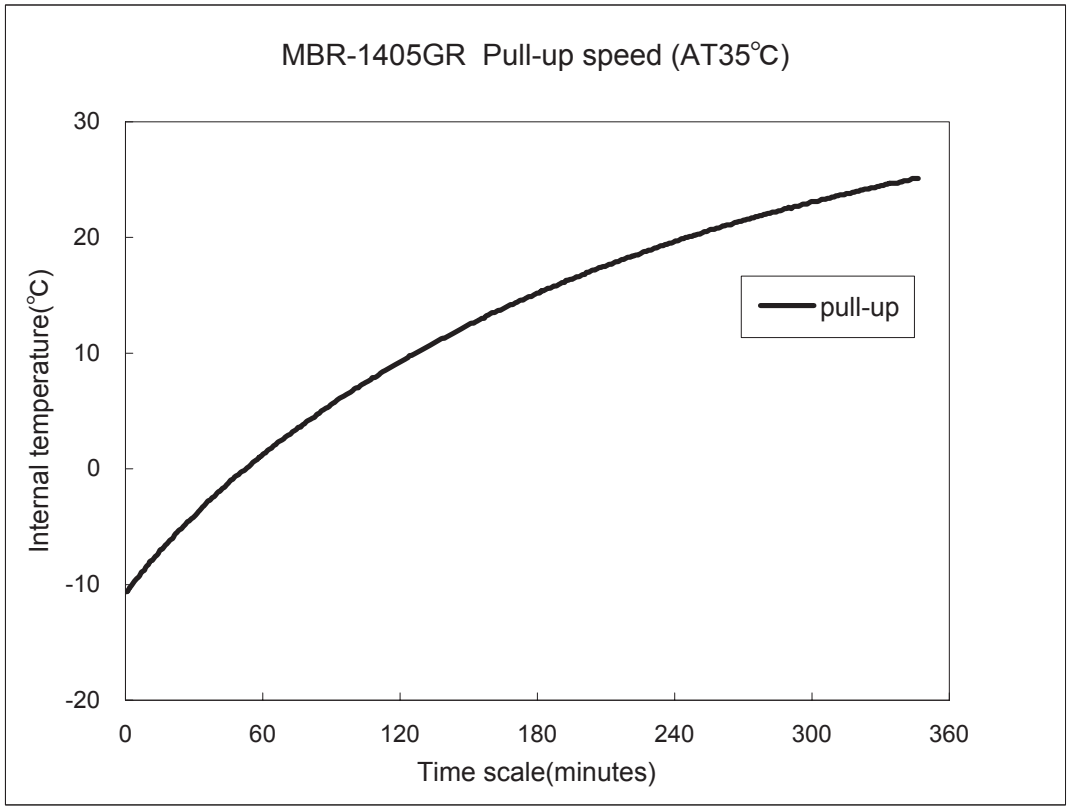
Cooling fan (Left side)

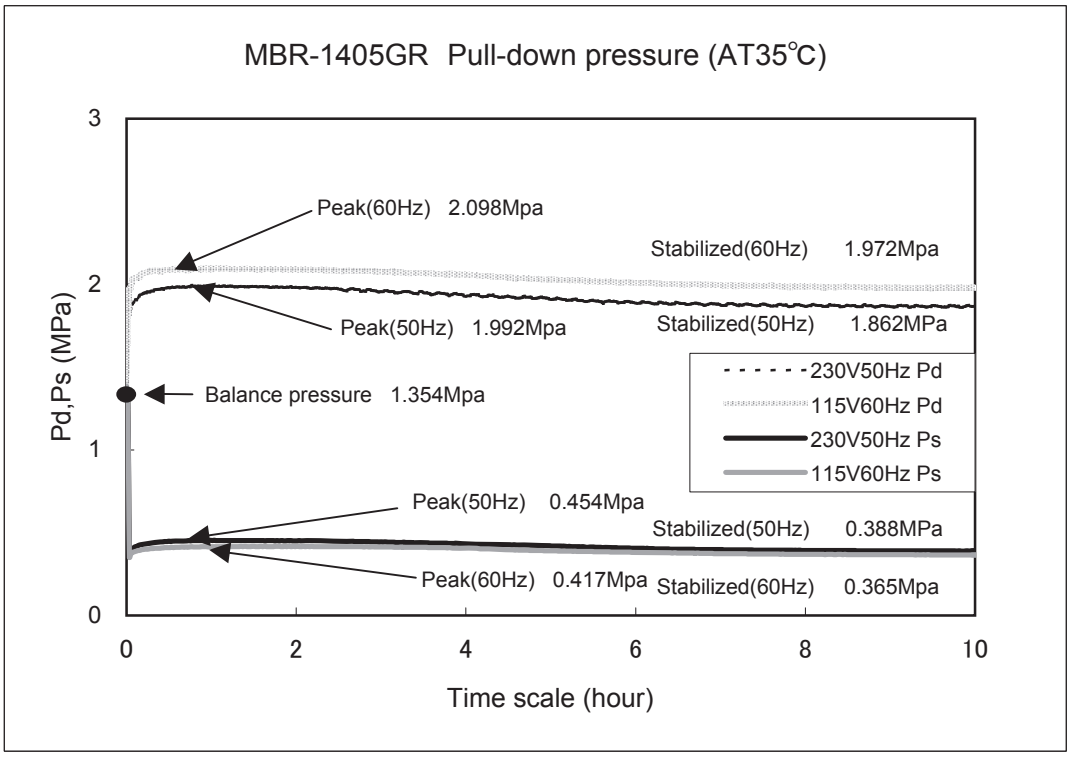
Temp. sensor
Alarm sensor
Thermostat for high temp. alarm

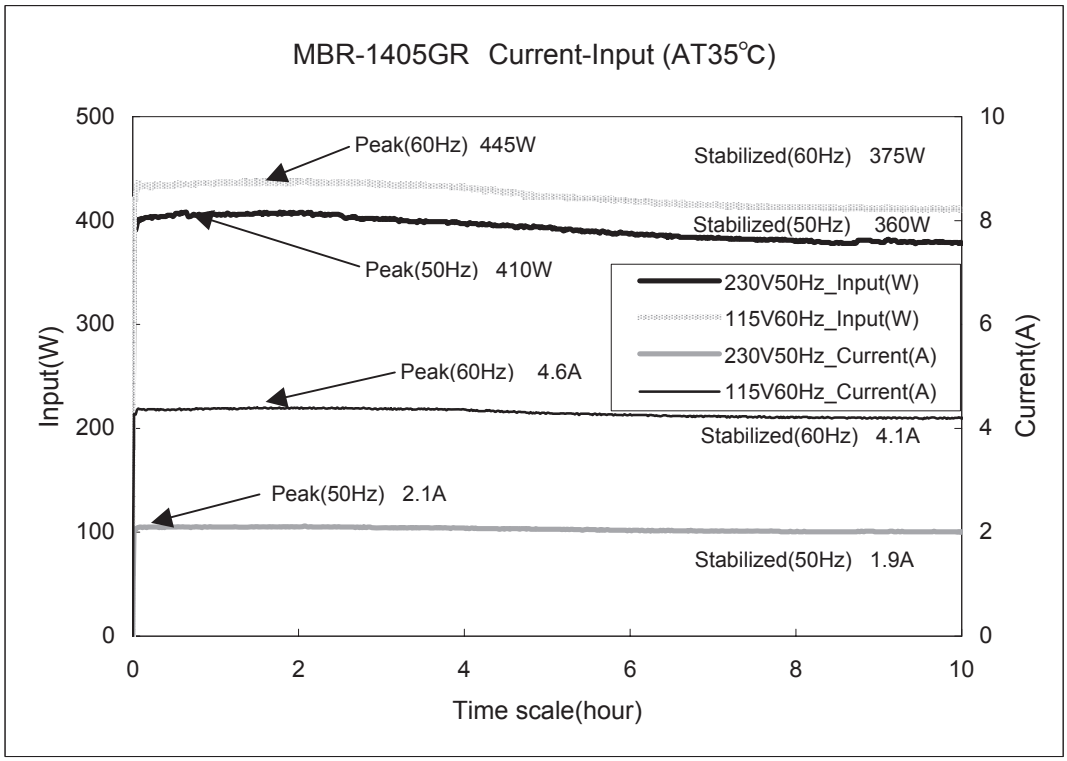
Test data

Note) Following data are the reference only.



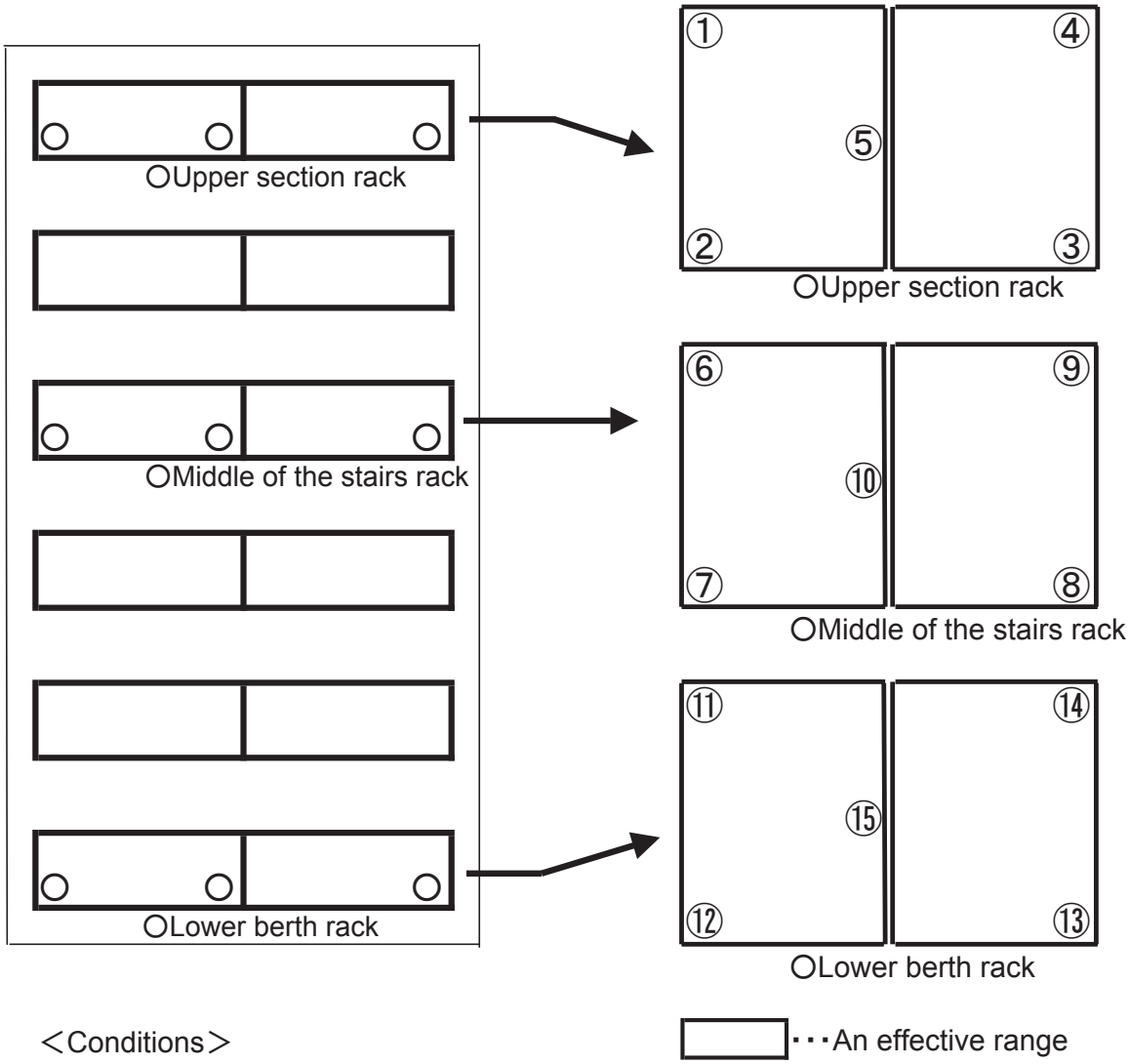



MBR-1405GR Pull-down pressure (AT35℃)
Pd,Ps (MPa)
Time scale (hour)
Peak(60Hz) 2.098Mpa
Stabilized(60Hz) 1.972Mpa
Peak(50Hz) 1.992Mpa
Stabilized(50Hz) 1.862MPa
Balance pressure 1.354Mpa
230V50Hz Pd
115V60Hz Pd
230V50Hz Ps
115V60Hz Ps
Peak(50Hz) 0.454Mpa
Stabilized(50Hz) 0.388MPa
Peak(60Hz) 0.417Mpa
Stabilized(60Hz) 0.365Mpa


MBR-1405GR Current-Input (AT35℃)
Input(W)
Current(A)
Time scale(hour)
Peak(60Hz) 445W
Stabilized(60Hz) 375W
Stabilized(50Hz) 360W
Peak(50Hz) 410W
230V50Hz_Input(W)
115V60Hz_Input(W)
230V50Hz_Current(A)
115V60Hz_Current(A)
Peak(60Hz) 4.6A
Stabilized(60Hz) 4.1A
Peak(50Hz) 2.1A
Stabilized(50Hz) 1.9A

Temperature Uniformity (15points measured)

* All the data are the reference only.



＜Conditions＞
Ambient temperature: 20/30℃
Load: A full road

＜Distribution data＞

Temperature of the cycle in each area (SV=4℃、Load temperature)

Unit:℃

	Ambient temperature 20℃							
	50Hz				60Hz			
	Maximum	Minimum	Middle of cycle	Differential	Maximum	Minimum	Middle of cycle	Differential
①	3.8	3.6	3.7	±0.10	3.6	3.4	3.5	±0.10
②	4.5	4.5	4.5	±0.00	4.4	4.3	4.4	±0.05
③	4.8	4.7	4.8	±0.05	4.7	4.6	4.7	±0.05
④	4.1	4.0	4.0	±0.05	4.1	4.0	4.0	±0.05
⑤	4.5	4.3	4.4	±0.10	4.1	4.0	4.1	±0.05
⑥	3.9	3.7	3.8	±0.10	3.7	3.6	3.6	±0.05
⑦	4.3	4.1	4.2	±0.10	4.2	4.1	4.1	±0.05
⑧	4.5	4.3	4.4	±0.10	4.5	4.5	4.5	±0.00
⑨	4.1	4.0	4.0	±0.05	4.0	3.8	3.9	±0.10
⑩	4.0	3.8	3.9	±0.10	4.1	4.0	4.1	±0.05
⑪	3.9	3.6	3.8	±0.15	3.8	3.7	3.8	±0.05
⑫	3.9	3.7	3.8	±0.10	3.9	3.8	3.9	±0.05
⑬	4.2	4.1	4.2	±0.05	4.2	4.1	4.2	±0.05
⑭	3.9	3.7	3.8	±0.10	4.1	3.9	4.0	±0.10
⑮	3.9	3.7	3.8	±0.10	3.8	3.7	3.8	±0.05
Average	-	-	4.1	-	-	-	4.0	-

Unit:℃

	Ambient temperature 30℃							
	50Hz				60Hz			
	Maximum	Minimum	Middle of cycle	Differential	Maximum	Minimum	Middle of cycle	Differential
①	3.6	3.5	3.5	±0.05	3.1	2.8	3.0	±0.15
②	4.7	4.6	4.6	±0.05	4.2	4.0	4.1	±0.10
③	5.1	5.0	5.0	±0.05	4.4	4.3	4.3	±0.05
④	3.9	3.8	3.9	±0.05	3.6	3.4	3.5	±0.10
⑤	4.5	4.3	4.4	±0.10	3.7	3.6	3.6	±0.05
⑥	3.7	3.6	3.6	±0.05	3.3	3.1	3.2	±0.10
⑦	4.2	4.1	4.1	±0.05	3.8	3.7	3.7	±0.05
⑧	4.5	4.4	4.5	±0.05	4.1	4.0	4.1	±0.05
⑨	4.0	3.9	3.9	±0.05	3.4	3.3	3.4	±0.05
⑩	3.6	3.5	3.6	±0.05	3.6	3.4	3.5	±0.10
⑪	3.7	3.6	3.6	±0.05	3.5	3.4	3.4	±0.05
⑫	3.8	3.6	3.7	±0.10	3.6	3.4	3.5	±0.10
⑬	4.2	4.1	4.2	±0.05	3.9	3.8	3.8	±0.05
⑭	3.8	3.6	3.7	±0.10	3.6	3.5	3.6	±0.05
⑮	3.6	3.6	3.6	±0.00	3.3	3.2	3.3	±0.05
Average	-	-	4.0	-	-	-	3.6	-

Note:This data does not represent a guarantee of product performance.

＜Amount of power consumption＞

Amount of power consumption when driving at cycle (SV=4℃)

Unit：kWh/day

	Ambient temperature 20℃		Ambient temperature 30℃	
	50Hz	60Hz	50Hz	60Hz
110V	-	6.62	-	7.69
115V	-	7.06	-	8.00
220V	6.52	-	7.34	-
230V	6.83	-	7.76	-
240V	7.19	-	8.09	-

＜Maximum heat discharge＞

Unit：KJ

	50Hz	60Hz
110V	-	1548
115V	-	1602
220V	1476	-
230V	1476	-
240V	1512	-

Note:This data does not represent a guarantee of product performance.

Instruction manual

・This section is extracted and printed from Instruction Manual.

・If you find out “Refer to page ●●” in them, this page means not page in Service manual but page in the lower corner of each page in the extract from Instruction Manual.
This page number is not corresponded with serial number in Service manual.

・**The attached Instruction Manual corresponds to the specifications for initial production, so the contents may be changed without notice.**

SANYO

INSTRUCTION MANUAL

MBR-1405G
MBR-1405GR

Blood Bank Refrigerator

MBR-1405GR

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INTRODUCTION

■ Read this manual carefully before using the appliance and follow the instructions for safety operation.

■ Sanyo never guarantee any safety if the appliance is used for any objects other than intended use or used by any procedures other than those mentioned in this manual.

■ Keep this manual in an adequate place to refer to it as necessary.

■ The contents of the manual will be subjected to change without notice due to the improvement of performance or functions.

■ Contact Sanyo sales representative or agent if any page of the manual is lost or page order is incorrect.

■ Contact Sanyo sales representative or agent if any point in this manual is unclear or if there are any inaccuracies.

■ No part of this manual may be reproduced in any form without the expressed written permission of Sanyo.

⚠CAUTION

SANYO guarantees the product under certain warranty conditions. SANYO in no way shall be responsible for any loss of content or damage of content.

PRECAUTIONS FOR SAFE OPERATION

It is imperative that the user complies with this manual as it contains important safety advice.

Items and procedures are described so that you can use this unit correctly and safely. If the precautions advised are followed, this will prevent possible injury to the user and any other person.

Precautions are illustrated in the following way:

⚠WARNING

Failure to observe WARNING signs could result in a hazard to personnel possibly resulting in serious injury or death.

⚠CAUTION

Failure to observe CAUTION signs could result in injury to personnel and damage to the unit and associated property.

Symbol shows;

△ this symbol means caution.

⃠ this symbol means an action is prohibited.

● this symbol means an instruction must be followed.

Be sure to keep this manual in a place accessible to users of this unit.

< Label on the unit >

This mark is labeled on the cover in which the electrical components of high voltage are enclosed to prevent the electric shock.
The cover should be removed by a qualified engineer or a service personnel only.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.

Only qualified engineers or service personnel should install the unit. The installation by unqualified personnel may cause electric shock or fire.

Install the unit on a sturdy floor and take an adequate precaution to prevent the unit from turning over. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.

Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

Never install the unit in a flammable or volatile location. This may cause explosion or fire.

Never install the unit where acid or corrosive gases are present as current leakage or electric shock may result due to corrosion.

Always ground (earth) the unit to prevent electric shock. If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod. Such grounding may cause electric shock in the case of an incomplete circuit.

Connect the unit to a power source as indicated on the rating label attached to the unit. Use of any other voltage or frequency other than that on the rating label may cause fire or electric shock.

Never store volatile or flammable substances in this unit if the container cannot be sealed. These may cause explosion or fire.

Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet on the unit. This may cause electric shock or injury by accidental contact with moving parts.

Use this unit in safe area when treating the poison, harmful or radiate articles. Improper use may cause bad effect on your health or environment.

Turn off the power switch (if provided) and disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Do not touch any electrical parts (such as power supply plug) or operate switches with a wet hand. This may cause electric shock.

PRECAUTIONS FOR SAFE OPERATION

⚠WARNING

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Never splash water directly onto the unit as this may cause electric shock or short circuit.

Never put containers with liquid on the unit as this may cause electric shock or short circuit when the liquid is spilled.

Never bind, process, or step on the power supply cord, or never damage or break the power supply plug. A broken supply cord or plug may cause fire or electric shock.

Do not use the supply cord if its plug is loose. Such supply cord may cause fire or electric shock.

Never disassemble, repair, or modify the unit yourself. Any such work carried out by an unauthorized person may result in fire, or electric shock or injury due to a malfunction.

Disconnect the power supply plug if there is something wrong with the unit. Continued abnormal operation may cause electric shock or fire.

When removing the plug from the power supply outlet, grip the power supply plug, not the cord. Pulling the cord may result in electric shock or fire by short circuit.

Disconnect the power supply plug before moving the unit. Take care not to damage the power cord. A damaged cord may cause electric shock or fire.

Disconnect the power plug when the unit is not used for long periods. Keeping the connection may cause electric shock, current leakage, or fire due to the deterioration of insulation.

If the unit is to be stored unused in an unsupervised area for an extended period, **ensure that children do not have access and that doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Remove doors to prevent accidents such as suffocation.

Do not put the packing plastic bag within reach of children as suffocation may result.

PRECAUTIONS FOR SAFE OPERATION

⚠CAUTION

Use a dedicated power source (a dedicated circuit with a breaker) as indicated on the rating label attached to the unit. A branched circuit may cause fire resulting from abnormal heating.

Connect the power supply plug to the power source firmly after removing the dust on the plug. A dusty plug or improper insertion may cause a heat or ignition.

Never store corrosive substances such as acid or alkali in this unit if the container cannot be sealed. These may cause corrosion of inner components or electric parts.

Check the setting when starting up of operation after power failure or turning off of power switch. The stored items may be damaged due to the change of setting.

Be careful not to tip over the unit during movement to prevent damage or injury.

Prepare a safety check sheet when you request any repair or maintenance for the safety of service personnel.

ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe at least under the following conditions (based on the IEC 61010-1):

■ Indoor use;

■ Altitude up to 2000 m;

■ Ambient temperature 5°C to 40°C

■ Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C;

■ Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage;

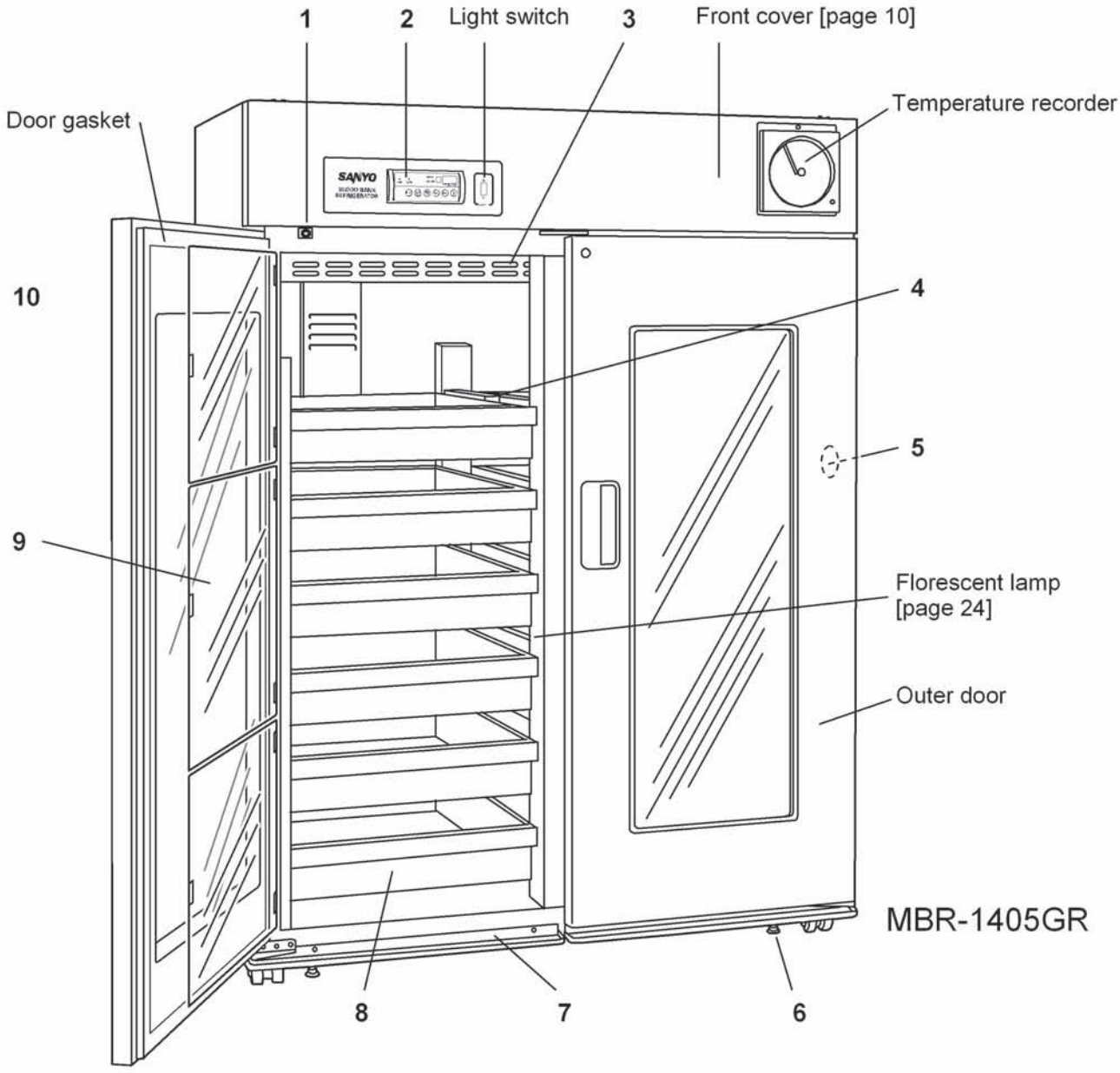
■ Other supply voltage fluctuations as stated by the manufacture;

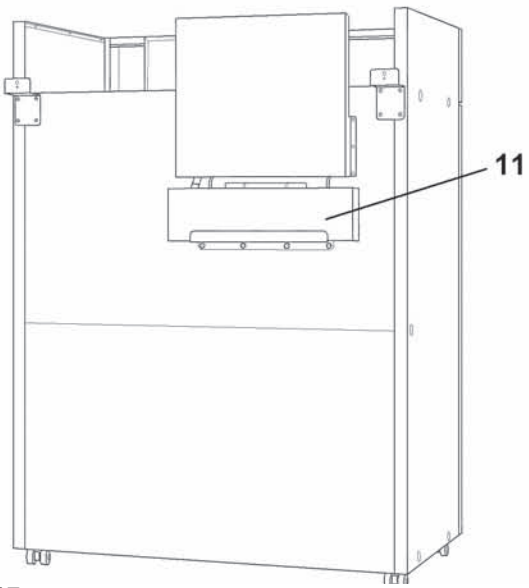
■ Transient overvoltages according to Installation Categories (Overvoltage Categories) II; For mains supply the minimum and normal category is II;

■ Pollution degree 2 in accordance with IEC 60664.

REFRIGERATOR COMPONENTS

Refrigerator unit





<Back side>

REFRIGERATOR COMPONENTS

1. Door alarm switch: This switch detects the door status (open/close). The door check lamp is ON when the door is open and the alarm buzzer sounds with 2 minutes delay. [page 20]

2. Control panel: With the key on the control panel, temperature display can be changed and the alarm test is available. Also, the running status can be checked on the temperature display and an indicator. [page 11]

3. Air intake vent (upper front): Do not block this vent. Blocking this vent may cause unstable chamber temperature. Do not insert fingers or similar articles into the vent.

4. Monitor bottle (upper and lower): A sensor to display the chamber temperature is attached to the monitor bottle. Fill the bottle with 200 mL of 10% glycerol fluid or water before commencing the operation. [page 16]

5. Access port (right and left side): This port allows a sensor or cable of measuring equipment to enter the chamber from outside.
✧ Replace the insulation and the rubber caps when the access port is not used. Improper replacement may cause rise of chamber temperature or condensation around the access port.

6. Leveling foot (front, 2 locations): These are screw bolts used to install and fix the unit. Adjust the height of the leveling feet by turning the screw bolts until 2 front casters are away from the floor. [page 13]

7. Dew receiver: The condensation on the outer door is accumulated on this dew receiver. Wipe off the water on the dew receiver with a cloth.
✧ The condensation may be found on the outer door frame with ambient humidity of about 50%R.H. and on the glass surface of the outer door with ambient humidity of about 60%R.H. This is not a malfunction.

8. Shelf (MBR-1405G): The set location is adjustable. The maximum load is 40 kg per shelf.
Drawer (MBR-1405GR): The maximum load is 40 kg per drawer.
✧ Items to be stored in the chamber must be placed on the shelves or drawers. Do not put storage items directly on the bottom of the chamber.

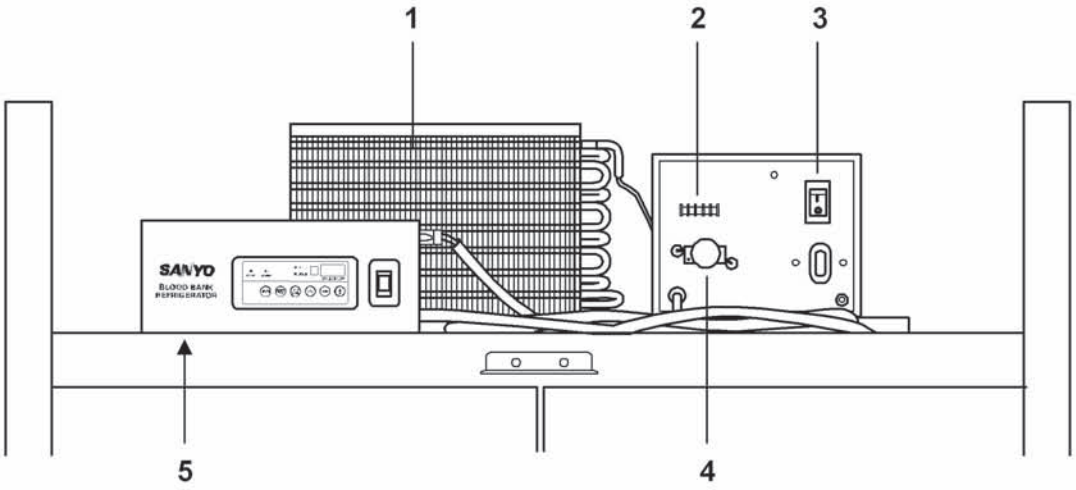
9. Inner door: This prevents the cold air from escaping when the outer door is opened. Always close the inner door surely before closing the outer door.

10. Air exhaust vent (bottom): Do not block this vent. Blocking this vent may cause unstable chamber temperature. Arrange the storage items not to subject to the cold air from this vent.

11. Evaporating tray: Defrost water from the evaporator accumulates on the evaporating tray and evaporates into the atmosphere. See page 23 for cleaning.

REFRIGERATOR COMPONENTS

Inside of front cover



1. Condenser filter: This filter is to prevent dust from plugging the condenser. Clean the condenser filter once a month. See page 23 for cleaning.

2. Remote alarm terminal: Refer to page 18.

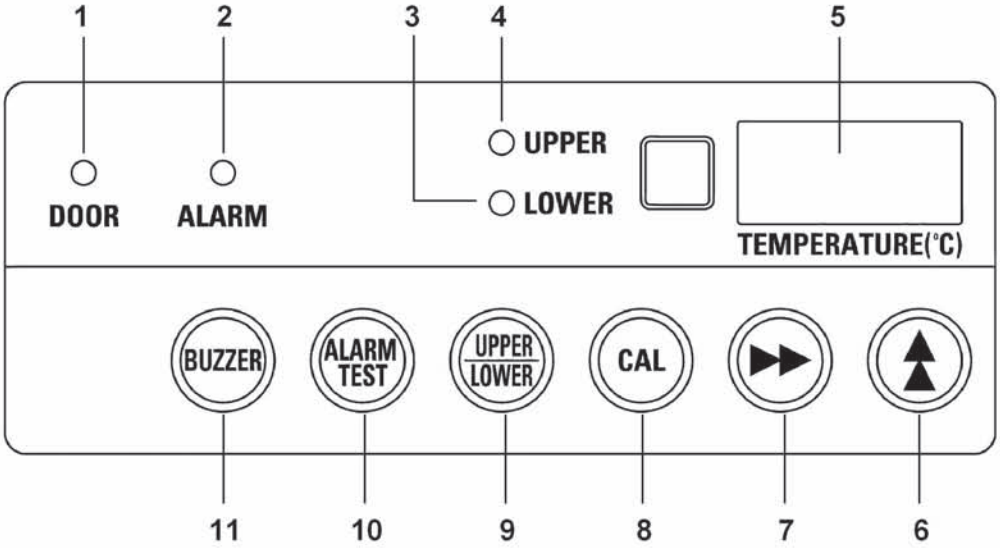
3. Power switch: " | "; ON, "O"; OFF.

4. Glow starter: This is for the fluorescent lamp. Replace the glow starter when the fluorescent lamp is replaced. For the replacement, refer to page 25.

5. Battery switch (at the bottom): ON-OFF switch for built-in battery for power failure alarm. Always turn on this switch when the blood bank refrigerator is operated to assure the power failure alarm. Turn off this switch when the blood bank refrigerator is not used for long period to protect the battery.

REFRIGERATOR COMPONENTS

Control panel components



1. Door check indicator (DOOR): The red LED lamp is lit when the outer door is opened.

✧ 2 minutes after the door check indicator is ON, the buzzer is activated to notice the door opening. [page 20]

2. Alarm indicator (ALARM): The red LED lamp blinks during an alarm status. [page 20]

3. Temperature display indicator (LOWER): This lamp is lit when the lower monitor bottle temperature is displayed or when the average temperature of lower and upper monitor bottle temperature is displayed on the temperature display.

4. Temperature display indicator (UPPER): This lamp is lit when the upper monitor bottle temperature is displayed or when the average temperature of lower and upper monitor bottle temperature is displayed on the temperature display.

5. Temperature display: Normally this shows the present chamber temperature and during an alarm status, this shows a blinking chamber temperature [page 20]. And an error code and a blinking chamber temperature is displayed alternately when the self diagnostic function detects any abnormality. [page 21]

6. Up arrow key (▲): This key is used at calibration mode of sensor for temperature display. Pressing this key at calibration mode causes the numerical value to change. [page 19]

7. Scroll key (▶▶): This key is for service and used by a service personnel only.

8. Calibration key (CAL): This key is used for the calibration of sensor for temperature display. Pressing this key for more than 5 seconds leads "calibration mode". [page 19]

✧ Use this key only when the calibration of sensor for temperature display is necessary.

9. Temperature display changeover key (UPPER/LOWER): By pressing this key, the displayed temperature is changed in sequence; upper temperature, lower temperature, and average temperature of upper and lower temperature. [page 17]

10. Alarm test key (ALARM TEST): This key is used to check the operation of alarm buzzer, alarm indicator and remote alarm terminal. [page 20]

11. Alarm buzzer stop key (BUZZER): Pressing this key silences the alarm buzzer when the alarm indicator blinks and the alarm buzzer sounds.

INSTALLATION SITE

To operate this unit properly and to obtain maximum performance, install the unit in a location with the following conditions:

✧ A location not compliance with the following conditions may cause poor performance, failure or accident.

■ A location not subjected to direct sunlight

Do not install the unit under direct sunlight. Installation in a location subjected to direct sunlight may degrade the performance.

■ A location with adequate ventilation

Leave at least 10 cm around the unit for ventilation. Poor ventilation will result in a reduction of the performance and consequently the failure.

■ A location away from heat generating sources

Avoid installing the unit near heat-emitting appliances such as a heater or a boiler etc. Heat can decrease the intended performance of the unit.

■ A location with little temperature change

Install the unit under stable ambient temperature. Installing the unit under unstable ambient temperature may result in unstable performance.

■ A location with a sturdy and level floor

Always install the unit on a sturdy and level floor withstanding the total weight of the unit. The uneven floor or tilted installation may cause failure or injury. Unstable condition may cause vibration or noise.

■ A location not prone to high humidity

Install the unit in the ambient of 80% R.H. or less humidity. Installation under high humidity may cause current leakage or electric shock.

⚠CAUTION

The unit may collect excessive frost on the evaporator if it is installed in high temperature and high humidity location. This will cause frequent defrosting.

■ A location without flammable or corrosive gas

Never install the unit in a flammable or volatile location. This may cause explosion or fire or may result in the current leakage or electric shock by the corrosion of the electrical components.

⚠CAUTION

Never install the unit in a location where the corrosive material such as sulfur compound is likely to be generated (near a drainage facilities, etc). Corrosion of the copper pipe may result in deterioration of cooling unit and consequently the failure.

■ A location without the possibility of anything fall

Avoid installing the unit in the location where anything can fall down onto the unit. This may cause the breakdown or failure of the unit.

INSTALLATION

1. After unpackaging

Remove all transportation packaging materials and tapes. Open the doors and ventilate the unit. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent.

✧ Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.

✧ After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the panels with a dry cloth.

2. Installing the unit

Extend the leveling feet by rotating them counterclockwise to separate 2 front casters from the floor. [Fig. 1]

And adjust the leveling feet to level the unit.

✧ The unit is installed firmly by separating the front casters from the floor. The unit may be moved at the time of opening/closing the door if the front casters contact with floor.

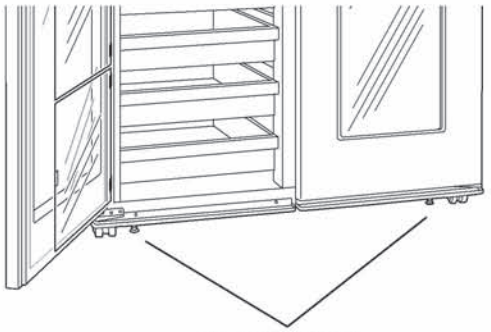


Fig. 1

3. Fixing the unit

2 fixtures are attached on the rear of the unit. These keep adequate space between the unit and wall and also can be used for fixing the unit. Fix the unit to the wall by using these fixtures and a rope or chain. [Fig. 2]

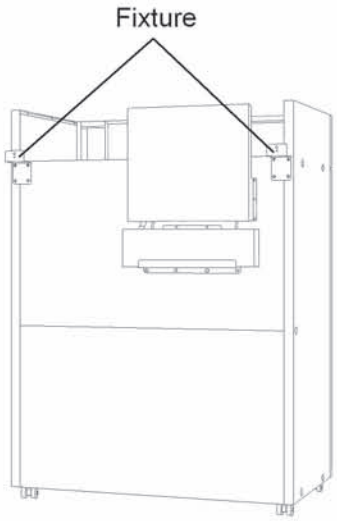


Fig. 2

4. Ground (earth) the unit

The ground (earth) is for preventing the electric shock in the case of the electrical insulation is somehow degraded. Always ground the unit at the time of installation.

✧ A 3-prong plug with grounding pole is provided to the poser supply cord. There is no need for electric work for grounding.

✧ If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.

START-UP OF UNIT

Follow the procedures for the initial and consequent operations of the unit.
✧ At the recovery from power failure, the operation is start-up automatically with temperature setting of 4 ±1.5°C

1. With the blood bank refrigerator empty, connect the power supply plug to the dedicated outlet with appropriate rating, and turn on the power switch.
➽ The alarm buzzer operates. Silence the alarm buzzer by pressing the alarm buzzer stop key (BUZZER). The alarm buzzer recovers after 30 minutes. (This is caused by high temperature alarm function and not a malfunction.)

2. Fill the monitor bottles with 10% glycerol fluid or water of 200 mL. [page 16]
<Important>
Close the doors (outer and inner door) securely. The door check indicator is lit when the outer door is open. The alarm buzzer activates when the outer door is opened for more than 2 minutes. The alarm buzzer is canceled when the outer door is closed.

3. The chamber temperature is set to 4±1.5°C at the factory. Check that the chamber temperature reaches 4±1.5°C on the temperature display.
✧ Check that the chamber temperature falls to 4±1.5°C on the temperature display when the start-up after cleaning, maintenance or moving.

4. Turn on the light switch to check the fluorescent lamp is on. After checking, turn off the light switch if the light is not necessary.

5. Turn on the battery switch.
<Important>
Always turn on the battery switch when the blood bank refrigerator is operating to assure the power failure alarm.

6. Begin slowly placing items into the chamber to minimize the temperature rise.
<Important>
Never put the storage items on the bottom of the chamber. Always put the storage items on the shelf or in the drawer.

<Attention>
The outer door has a condensation on the glass during refrigerator operation. Wipe off the condensation with a dry soft cloth. Also, wipe off the water on the dew receiver regularly.

PLACING OF STORAGE ITEMS

Do not disturb the air circulation in the chamber by the storage items. The disturbed air circulation can cause the freezing of storage items or degrade of temperature distribution in the chamber.

Air intake vent

Do not block the air intake by the storage items near the air intake vent. Care should be taken not to put any paper or plastic chips near the air intake vent. They may be vacuumed up and block the air intake vent.

Air exhaust vent

Do not block the air exhaust by the storage items near the air exhaust vent. Care should be taken not to put storage items nearby the air exhaust vent. The storage items may be frozen.

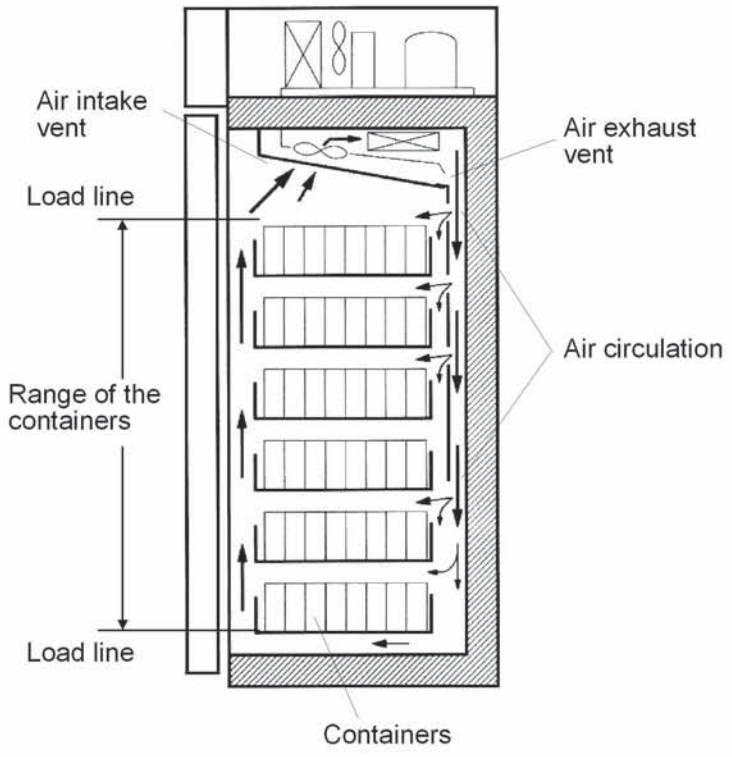
Load line [Fig. 3]

The storage area is limited to ensure the air flow in the chamber. The labels "load line" are attached to the right and left side of the chamber. Always put the storage items within the area limited by the labels.

⚠CAUTION

Never block the air intake or exhaust vent. Also, never disturb the air circulation therefore, place the storage items with adequate space.

Never store corrosive substances such as acid or alkali in this unit if the container cannot be sealed. These may cause corrosion of inner components or electric parts.



< Section view >

Fig. 3

PREPARATION OF MONITOR BOTTLE

Before start-up of the operation, fill the monitor bottles (upper and lower) with 10% glycerol fluid or water of 200 mL by following the procedure below.

1. Remove the bottom shelf (for model MBR-1405G) or remove the top and bottom drawer (for model MBR-1405GR).

2. Remove the cover on the monitor bottle.
✧ The cover is fixed by the upper and lower clicks. It can be removed by pulling the upper side forward as shown in figure 4.

3. Take out the sensor for temperature display from the monitor bottle.
✧ The sensor for temperature display is not fixed, therefore it is removed together with the cover.
✧ For the upper monitor bottle, take out the recorder sensor as well.

4. Remove the fixing screws (2 screws) and take out the monitor bottle.

5. Remove the cap (screw type) on the monitor as shown in the figure 5.

6. Pour 10% glycerol fluid or water of 200 mL into the monitor bottle.

7. Cap the monitor bottle and fix the monitor bottle to its original location by the fixing screws.

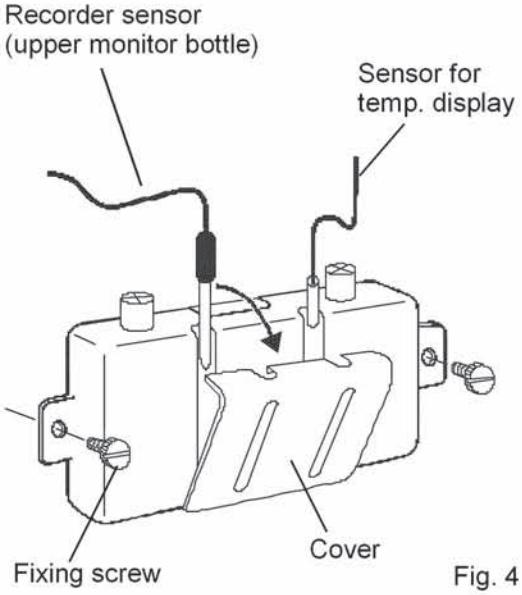


Fig. 4

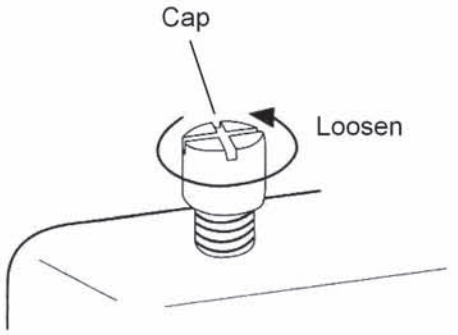


Fig. 5

8. Set the sensor for temperature display to the monitor bottle and replace the cover.
✧ For the upper monitor bottle, set the recorder sensor as well.

9. Replace the bottom shelf (for model MBR-1405G) or replace the top and bottom drawer (for model MBR-1405GR).

DISPLAY OF CHAMBER TEMPERATURE

The chamber temperature is set to 4±1.5°C at the factory. The temperature on the temperature display shows the temperature of sensor for temperature display attached to the monitor bottle (upper and lower). By pressing the temperature display changeover key, the displayed temperature is changed in sequence; upper temperature, lower temperature, and average temperature of upper and lower temperature. The table 1 shows the procedure for changeover.

<Important>

The upper temperature is the representative of high temperature and the lower temperature is the representative of low temperature. Accordingly, the displayed temperature is not always 4±1.5°C. This is not a malfunction.

Table 1. Changeover of temperature display ●: Lamp ON ○: Lamp OFF

	Operation	Key operated	Indication after operation	Display mode
1	Plug-in the power supply plug and turn on the power switch.	-----	Average temperature is displayed. ● UPPER ● LOWER	Average temperature
2	Press the temperature display changeover key.	UPPER/LOWER	Upper temperature is displayed. ● UPPER ○ LOWER	Upper temperature
3	Press the temperature display changeover key.	UPPER/LOWER	Lower temperature is displayed. ○ UPPER ● LOWER	Lower temperature
4	Press the temperature display changeover key.	UPPER/LOWER	Average temperature is displayed. ● UPPER ● LOWER	Average temperature
5	Repeat from step 2.			

DFROSTING OF EVAPORATOR

The following 2 defrost methods are adopted in this unit. Both of them are controlled automatically.

■ Cycle defrost

To keep the chamber temperature stable, the compressor is cycled on and off. During "off" period any frost which has accumulated on the evaporator is melted by energizing a defrost heater. This will not have any discernible effect on the chamber temperature.

■ Forced defrost

When the ambient humidity is high, or a large amount of damp product is being stored in the chamber, there is a possibility that cycle defrost may not be enough to remove all of the frost on the evaporator. In this case, a forced defrost can be initiated.

When the unit is operating under a forced defrost, the current chamber temperature and "dF" is displayed alternately on the temperature display.

Once the forced defrost is completed, the normal operation resumes. The temperature of blood bag (400 mL) in the chamber rises by approximately 1 to 2°C during the forced defrost.

REMOTE ALARM TERMINAL

The alarm status is noticed to a remote location when a remote alarm equipment (commercial item) is connected to the remote alarm terminal. It is recommended to install a remote alarm equipment (commercial item) when the blood bank refrigerator is installed in a desolate location so that an alarm status is noticed to an operator.

✧ Contact Sanyo representative or agent for the installation of a remote alarm equipment (commercial item).

- Location of remote alarm terminal: inside the front cover
- Allowable contact capacity: DC 30 V・2 A

Contact output:

	between COM and N.O.	between COM and N.C.
At normal status	open	close
At abnormal status	close	open

✧ The alarm status of remote alarm terminal is cancelled by pressing the alarm buzzer stop key (BUZZER) since the remote alarm terminal is operated in conjunction with alarm buzzer. However, the alarm status of remote alarm terminal is not cancelled by pressing the alarm buzzer stop key (BUZZER) when the unit is under power failure alarm.

✧ The remote alarm terminal is in alarm status when the power supply plug is unplugged because it is regarded as a power failure. In this case, the alarm status of remote alarm terminal is not cancelled by pressing the alarm buzzer stop key (BUZZER).

Connection of remote alarm terminal

1. Open the front cover by pulling firmly on both lower corners of the front cover.

2. Connect the lead wire of a remote alarm equipment (commercial item) to the terminal. [Fig.6]

3. Replace the front cover.

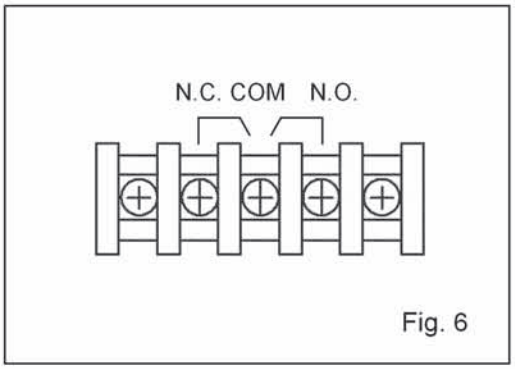


Fig. 6

CALIBRATION OF SENSOR

The temperature on the temperature display shows the temperature of sensor for temperature display attached to the monitor bottle (upper and lower).
Follow the procedure below when the calibration of the sensor for temperature display is necessary.

1. Remove the cover on the monitor bottle as shown in figure 7.

2. Take out the sensor for temperature display from the chamber.
✧ For the upper monitor bottle, it has a recorder sensor (left side) as well. Care should be taken not to take out the recorder sensor.

3. Prepare a bottle or beaker with a solution of crushed ice and cold water. Agitate the mixture thoroughly.

4. Put the sensor for temperature display to be calibrated in the mixture.

5. Select the temperature display by pressing temperature display changeover key to show the temperature of sensor for temperature display to be calibrated
✧ For the changeover of temperature display, refer to page 17.

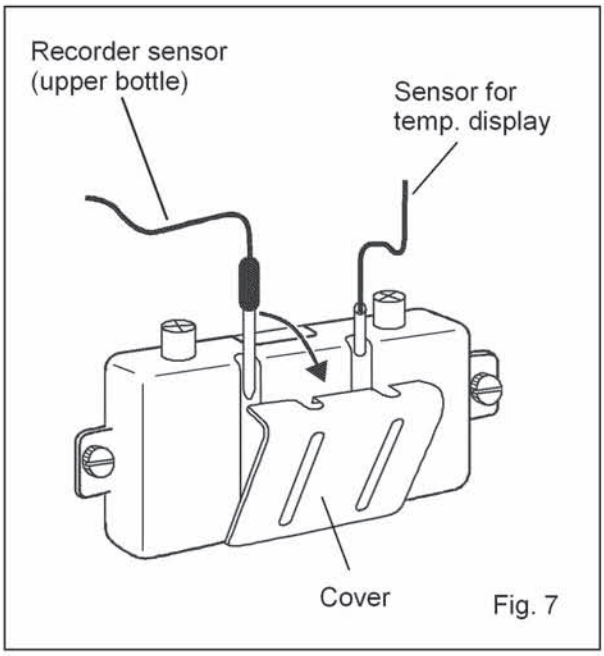


Fig. 7

6. While sometimes agitating the mixture, allow the temperature indicated on the temperature display to be stable.

7. Calibration is needed if the temperature on the temperature display does not show 0°C.

8. Press the calibration key (CAL) on the control panel for 5 seconds.
➽ The temperature display shows C00.

9. Set an identification code for sensor for temperature display by using the up arrow key (▲▲).
✧ The identification code for upper sensor for temperature display: C01
The identification code for lower sensor for temperature display: C02.
<Important>
Never set any identification code other than C01, C02.

10. Press the calibration key (CAL).

11. Check that the temperature shown on the temperature display is approximately 0°C.
✧ Repeat the above procedure through 6 to 10 if the temperature shown on the temperature display is out of range of 0±0.2°C.

12. Take out the sensor for temperature display from the mixture and wipe it with a dry and soft cloth.

13. Replace the sensor for temperature display and fix it with a cover.
✧ For the upper monitor bottle, also replace and fix the recorder sensor.

ALARM FUNCTIONS

This unit has the alarm functions shown below.
Contact Sanyo sales representative or agent if the alarm status continues because there is a possibility of any failure.

Alarms	Situation	Indication	Alarm buzzer	Remote alarm
High temp. alarm	If the temperature of the upper or lower sensor for temp. display is higher than 6°C.	Alarm indicator blinks. Displayed temp. blinks.	Intermittent tone	Alarm status
Low temp. alarm	If the temperature of the upper or lower sensor for temp. display is lower than 2°C.	Alarm indicator blinks. Displayed temp. blinks.	Intermittent tone	Alarm status
Power failure alarm	At the power failure. If the power supply plug is unplugged. When power switch of off.	Alarm indicator blinks. Temperature display is off.	Intermittent tone	Alarm status.
Door alarm	When the outer door is open.	Door check indicator lights.	Intermittent tone with 2 minutes delay.	-----

✧ The alarm status of remote alarm terminal is cancelled by pressing the alarm buzzer stop key (BUZZER) since the remote alarm terminal is operated in conjunction with alarm buzzer. However, the alarm status of remote alarm terminal is not cancelled by pressing the alarm buzzer stop key (BUZZER) when the unit is under power failure alarm.

✧ This unit is provided with the alarm buzzer recovery function. The alarm buzzer will operate again after 30 minutes if the alarm status continues even if the alarm buzzer was silenced by pressing the alarm buzzer stop key (BUZZER).

✧ The power failure alarm is kept for approximately 24 hours (when the battery is charged fully). 2-day operation of blood bank refrigerator is necessary to charge the fully discharged battery to full level. A remote alarm keeps alarm status even if the battery is discharged.

✧ The blood bank refrigerator resumes the operation with 4±1.5°C setting at the recovery from the power failure.

Checking of alarm operation

The alarm operation can be checked by the procedure below.

1. Press the alarm test key (ALARM TEST).

2. The alarm indicator blinks, the alarm buzzer sounds intermittently, and the remote alarm is in alarm status. This is kept for 90 seconds and finished automatically.

✧ During the 90 seconds, the alarm buzzer can not be silenced by pressing the alarm buzzer stop key (BUZZER).

3. The alarm operation can be canceled by pressing the alarm test key (ALARM TEST) again during the 90 seconds.

SELF DIAGNOSTIC FUNCTIONS

This unit has the self diagnostic functions shown below.
Contact Sanyo sales representative or agent if an error code (ex. E03) is displayed resulting from the self diagnostic.

Self diagnostic	Situation	Indication	Alarm buzzer	Remote alarm
Sensor abnormality	If the defrost sensor is disconnected.	Alarm indicator blinks. E03 and chamber temp. is displayed alternately.	Intermittent tone	Alarm status
	If the defrost sensor is short-circuited.	Alarm indicator blinks. E04 and chamber temp. is displayed alternately.		
	If the compressor sensor is disconnected.	Alarm indicator blinks. E05 and chamber temp. is displayed alternately.		
	If the compressor sensor is short-circuited.	Alarm indicator blinks. E06 and chamber temp. is displayed alternately.		
	If the low temp. alarm sensor is disconnected.	Alarm indicator blinks. E13 and chamber temp. is displayed alternately.		
	If the low temp. alarm sensor is short-circuited.	Alarm indicator blinks. E14 and chamber temp. is displayed alternately.		
	If the upper sensor for temp. display is disconnected.	Alarm indicator blinks. E15 and chamber temp. is displayed alternately.		
	If the upper sensor for temp. display is short-circuited.	Alarm indicator blinks. E16 and chamber temp. is displayed alternately.		
	If the lower sensor for temp. display is disconnected.	Alarm indicator blinks. E17 and chamber temp. is displayed alternately.		
	If the lower sensor for temp. display is short-circuited.	Alarm indicator blinks. E18 and chamber temp. is displayed alternately.		
Battery check	When about 3 years have passed with the power switch on. (time to replace the battery)	F-1 and chamber temp. is displayed alternately.	-----	-----
Fan motor check	When about 6 years have passed with the power switch on. (time to replace the fan motor)	F-2 and chamber temp. is displayed alternately.	-----	-----

✧ The alarm status of remote alarm terminal is cancelled by pressing the alarm buzzer stop key (BUZZER) since the remote alarm terminal is operated in conjunction with alarm buzzer. However, the alarm status of remote alarm terminal is not cancelled by pressing the alarm buzzer stop key (BUZZER) when the unit is under power failure alarm.

✧ This unit is provided with the alarm buzzer recovery function. The alarm buzzer will operate again after 30 minutes if the alarm status continues even if the alarm buzzer was silenced by pressing the alarm buzzer stop key (BUZZER).

ROUTINE MAINTENANCE

⚠WARNING

Always disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

Cleaning of exterior, interior, and accessories

Use a dry cloth to wipe off small amounts of dirt on the outside and inside of the unit and all accessories.
If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent.
Wipe off the condensation on the glass or exterior of the cabinet with a dry soft cloth.

✧ Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.

✧ After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the cabinet or accessories with a dry cloth.

<Important> Never pour water onto or into the unit. This may cause electric shock or failure.

⚠CAUTION

Do not use a brush, an acid, a thinner, a laundry soap, a powder detergent, boiling water for cleaning. These cause damage of painted surface or failure of plastic and rubber components. Also, do not wipe the plastic and rubber components by a volatile material.

Checking of alarm operation

Check the alarm operation regularly (once per 6 months) to assure the alarm is activated at the time of power failure. The alarm operation can be checked by the procedure below.

1. Press the alarm test key (ALARM TEST).

2. The alarm indicator blinks, the alarm buzzer sounds intermittently, and the remote alarm is in alarm status. This is kept for 90 seconds and finished automatically.

✧ During the 90 seconds, the alarm buzzer can not be silenced by pressing the alarm buzzer stop key (BUZZER).

3. The alarm operation can be canceled by pressing the alarm test key (ALARM TEST) again during the 90 seconds.

ROUTINE MAINTENANCE

Cleaning of condenser filter

The condenser filter is installed inside the front cover. Clean the condenser filter every 6 months to keep the appropriate cooling performance.

1. Open the front cover by pulling firmly on both lower corners of the front cover. [Fig. 8]

2. Raise the shaft, and insert end of a shaft in black hole of the front cover. This keeps the front cover from falling back.

3. Tug gently on black tab on lower center of condenser filter to remove the condenser filter.

4. Clean the condenser filter with a vacuum cleaner or water.

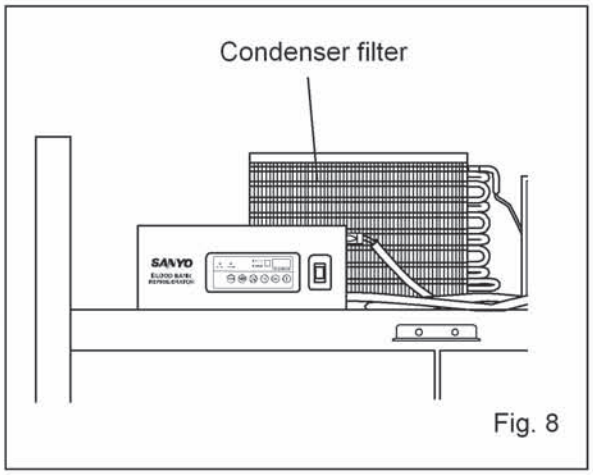


Fig. 8

5. Thoroughly dry the condenser filter when using water to clean it.

6. After cleaning the condenser filter, return it to the original position and replace the front cover.

Cleaning of evaporating tray

The evaporating tray is installed on the back of the unit. Clean the evaporating tray once a month.

1. Remove the tray fixture under the evaporating tray by unscrewing 4 screws and the evaporating tray is free. [Fig. 9]

2. Wash away any accumulated dirt in the evaporating tray.

3. Fix the evaporating tray with the tray fixture and 4 screws.

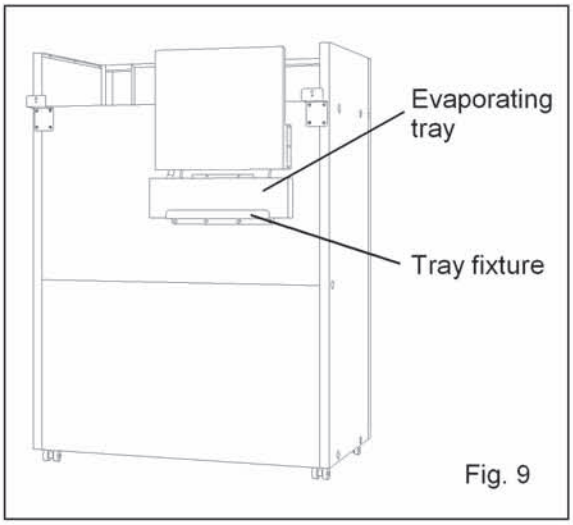


Fig. 9

ROUTINE MAINTENANCE

Replacement of fluorescent lamp

Follow the procedure below when replacing a fluorescent lamp. The fluorescent lamp is located vertically at the back of the center mullion. [Fig. 10]

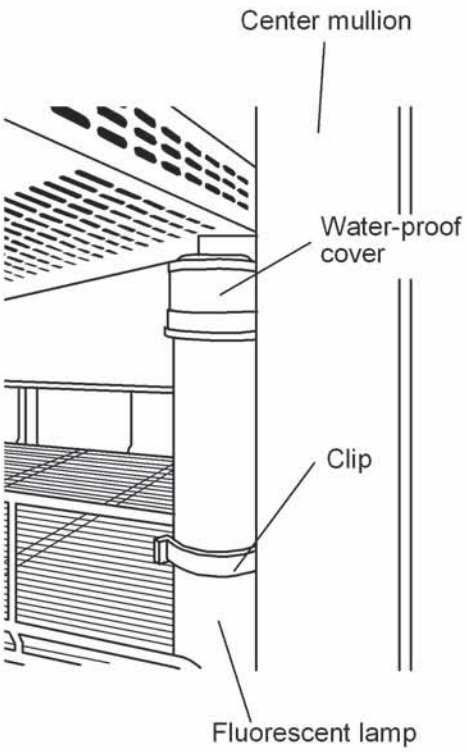


Fig. 10

1. Turn off the light switch and power switch and then disconnect the power supply plug.

2. Move the stored items on the left shelves (drawers) to the right shelves (drawers). Then remove all shelves (drawers) on the left side.

3. Pull the fluorescent lamp backwards with the lamp cover to remove the fluorescent lamp from the clips (2 locations) together with the lamp cover and the wiring.

4. After removing the water-proof cover, remove the socket with the wiring on the both sides of the lamp cover.

5. Take out the fluorescent lamp from the lamp cover and insert a new fluorescent lamp in it.
(fluorescent lamp; FL40SD)

6. Replace the socket with the wiring and the water-proof cover on the both sides of the lamp cover.

7. Fix the lamp cover with the clip (2 locations).

8. Replace the shelves (drawers) on the left side and return the stored items.

9. Connect the power supply plug to the outlet and turn on the power switch.

10. Turn on the light switch to check the fluorescent lamp is on.

ROUTINE MAINTENANCE

Replacement of glow starter

The glow starter is located inside the front cover. [Fig. 11]

1. Turn off the light switch and power switch and then disconnect the power supply plug.

2. Lift the front cover by pulling firmly on both lower corners of the front cover. Then raise the shaft, and insert end of a shaft in black hole of the front cover. This keeps the front cover from falling back.

3. Remove the glow starter and install a new glow starter. (glow starter; FG-1P)

4. Replace the front cover.

5. Connect the power supply plug to the outlet and turn on the power switch.

6. Turn on the light switch to check the fluorescent lamp is on.

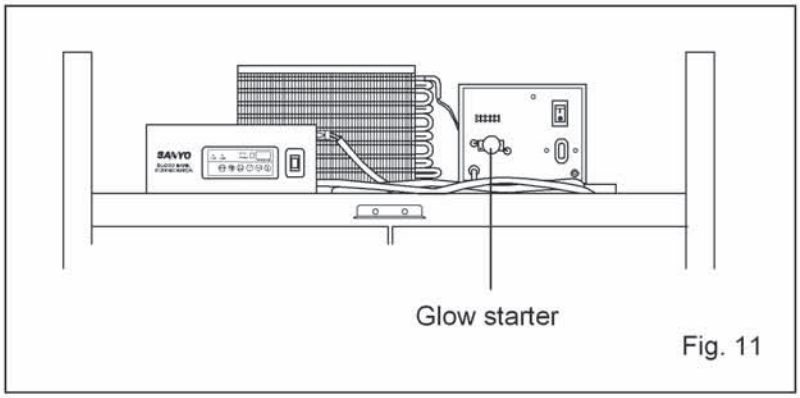


Fig. 11

REPLACEMENT OF BATTERY

Replace the battery for power failure alarm every 3 years (when F-1 and chamber temperature is displayed alternately to ensure the alarm is operated in the event of power failure. Contact Sanyo sales representative or agent for the replacement of battery when F-1 and chamber temperature is displayed alternately.

✧ The alarm function (blink of alarm indicator, sound of alarm buzzer) will not operate when the battery for power failure alarm is flat.

✧ The alarm indicator blinks and the alarm buzzer sounds by the battery for power failure alarm. The regular replacement of the battery for power failure alarm is important to prevent the rise of chamber temperature in the case of unexpected situation.

⚠WARNING

The replacement of the battery for power failure alarm should be executed by a qualified engineer or a service personnel only. The replacement of the battery for power failure alarm involves the risk of electric shock.

<Important>

The used battery is a recyclable precious resource. Do not dispose of the battery. Always follow the procedure for recycling.

Replacement of battery for power failure alarm

✧ The battery for power failure alarm is located at the back of the control panel. [Fig. 12] The battery is accessible from the top of the blood bank refrigerator.

1. Turn off the light switch and power switch and then disconnect the power supply plug.

2. Remove the cover behind the control panel by unscrewing 4 screws.

3. Disconnect the connector, loosen 2 screws fixing the battery bands and then remove the battery. [Fig. 13]

<Important>

Always put an insulating tape on the terminal portion of the used battery to prevent the short circuit.

4. Fix a new battery with 2 screws and battery bands, and then connect the connector.

5. Replace and fix the cover with 4 screws.

6. Connect the power supply plug to the outlet and turn on the power switch.

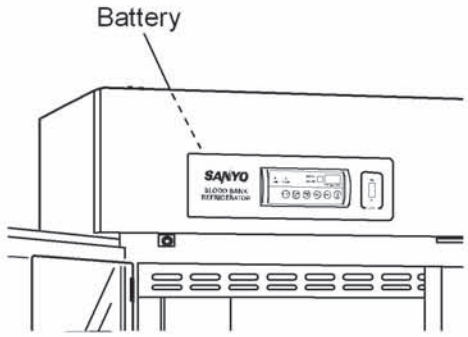
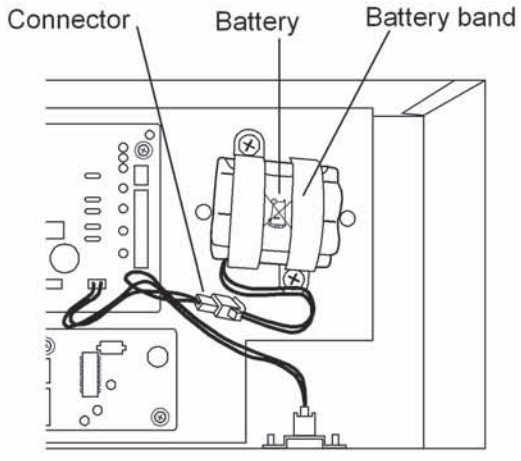


Fig. 12



<view from back side>

Fig. 13

TROUBLESHOOTING

If the unit malfunctions, check out the following before calling for service.

<Attention>
If the malfunction is not eliminated after checking the following items or the malfunction is not shown in the table below, contact Sanyo sales representative or agent.

Malfunction	Check/Remedy
If nothing operates even when plugged in	□ The unit is not connected to the power supply properly. □ The capacity and voltage of power supply is not sufficient. □ There is a power failure. □ The circuit breaker on the supply circuit is activated. → A breaker of 15 A or more is recommended. □ The fuse on the supply circuit is blown.
The alarm is activated at start-up	✧ The alarm status is kept until the chamber temperature reaches the set temperature. ➢ The alarm buzzer recovers after 30 minutes even if the alarm buzzer is silenced by pressing the alarm buzzer stop key (BUZZER).
The alarm is activated during operation	□ The unit is not connected to the power supply properly. □ The capacity and voltage of power supply is not sufficient. □ There is a power failure. □ The circuit breaker on the supply circuit is activated. → A breaker of 15 A or more is recommended. □ The fuse on the supply circuit is blown. □ The outer door was kept opened for a long time. □ The outer door is opened. □ An error code is displayed on the temperature display. [page 21] → Contact Sanyo sales representative or agent.
Noisy	□ The floor is not sturdy. □ The installation site is not level. □ The blood bank refrigerator is tilted. □ The cabinet contacts the surrounding wall.
When chamber does not get cold enough	□ The outer door is frequently opened. □ The inner door is open. □ The unit is in direct sunlight. □ The ventilation around the unit is blocked. □ There is a nearby heat source. □ The ambient temperature is too high. → The allowable ambient temperature is between 5 and 35°C. □ The storage items are too much. □ The air exhaust vent is blocked up with storage items. □ The access port is not covered. → The access port should be covered with the insulation and rubber caps when no use. □ The door gasket is damaged. → If it is damaged, contact Sanyo sales representative or agent for replacement. □ Any foreign substance is located between door gaskets.
The displayed temperature is not 4°C	The displayed temperature between 3 and 5°C (depending on the ambient temperature) is not a malfunction

DISPOSAL OF UNIT

⚠WARNING

If the unit is to be stored unused in an unsupervised area for an extended period **ensure that children do not have access and doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Always remove doors to prevent accidents such as suffocation.

Recycle of battery

The unit contains a rechargeable battery. The battery is recyclable. At the end of it's useful life, check with you local solid officials option or proper disposal.

＊Label indication is obliged to comply with Taiwanese battery regulation.

Decontamination of unit

Before disposal of unit, decontaminate the unit yourself.

DISPOSAL OF UNIT

(English)

FOR EU USERS

The symbol mark and recycling systems described below apply to EU countries and do not apply to countries in other areas of the world.

Your SANYO product is designed and manufactured with high quality materials and components which can be recycled and/or reused.

The symbol mark means that electrical and electronic equipment, batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.

Note:

If a chemical symbol is printed beneath the symbol mark, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows: Hg: mercury, Cd: cadmium, Pb: lead

In the European Union there are separate collection systems for used electrical and electronic equipment, batteries and accumulators.

Please, dispose of them correctly at your local community waste collection/recycling centre.

Please, help us to conserve the environment we live in!

(German)

Für EU-Staaten

Das Symbol und das erwähnte Wiederverwertungssystem gelten nur für die Länder der EU und nicht für andere Länder oder Gebiete in der Welt.

Die Produkte von SANYO werden aus hochwertigen Materialien und Komponenten gefertigt, die sich wieder verwenden lassen.

Das Symbol bedeutet, dass elektrische oder elektronische Geräte, Batterien und Akkus am Ende ihrer Lebensdauer nicht im Haushaltmüll entsorgt werden dürfen.

Hinweis:

Ein chemisches Zeichen unter dem Symbol bedeutet, dass die Batterie bzw. der Akku Schwermetalle in gewissen Konzentrationen enthält. Die Metalle werden wie folgt bezeichnet: Hg: Quecksilber, Cd: Kadmium, Pb: Blei

In der Europäischen Union gibt es separate Sammelstellen für elektrische und elektronische Geräte, Batterien und Akkus.

Entsorgen Sie solche Geräte bitte richtig in der kommunalen Sammelstelle bzw. im Recyclingzentrum.

Helfen Sie mit, die Umwelt in der wir leben, zu schützen.

DISPOSAL OF UNIT

(French)
POUR LES UTILISATEURS DE UE
Le symbole et les systèmes de recyclage évoqués ci-dessous s'appliquent uniquement aux pays de UE.

Votre produit SANYO est conçu et fabriqué avec des composants et des matériaux de hautes qualités qui peuvent être recyclés et/ou réutilisés.

Le symbole signifie que les équipements électriques et électroniques, les batteries et les accumulateurs ne doivent pas être mis au rebut avec les déchets domestiques à l'issue de leur durée de vie.

Remarque:
Si un symbole chimique est imprimé sous le symbole, le symbole chimique indique que la batterie ou l'accumulateur contient une certaine concentration de métaux lourds. Les métaux sont indiqués de la manière suivante: Hg: mercure, Cd: cadmium, Pb: plomb.

Il existe différents systèmes de collecte pour les équipements électriques et électroniques, les batteries et les accumulateurs usagés au sein de l'Union européenne.
Veuillez mettre les équipements au rebut de manière correcte, auprès de votre centre de recyclage/de collecte des déchets local.

Aidez-nous à préserver l'environnement dans lequel nous vivons!

Les machines ou appareils électriques et électroniques contiennent fréquemment des matières qui, si elles sont traitées ou éliminées de manière inappropriée, peuvent s'avérer potentiellement dangereuses pour la santé humaine et pour l'environnement.
Cependant, ces matières sont nécessaires au bon fonctionnement de votre appareil ou de votre machine. Pour cette raison, il vous est demandé de ne pas vous débarrasser de votre appareil ou machine usagé avec vos ordures ménagères.

(Spanish)
PARA USUARIOS DE LA UNION EUROPEA
El símbolo y los sistemas de reciclado descriptos a continuación se aplican para países de la Unión Europea y no se aplica para países en otras áreas del mundo.

Su producto SANYO fue diseñado y fabricado con materiales de alta calidad y componentes que pueden ser reciclados y/o vueltos a usar.

El símbolo significa que los equipos eléctricos y electrónicos, baterías y acumuladores, al final de su vida útil, debe ser desechados separadamente de sus residuos domiciliarios.

Nota:
Si hay un símbolo químico impreso debajo del símbolo, este símbolo químico significa que la batería o acumulador contiene una cierta concentración de un metal pesado. Esto es indicado de la siguiente manera: Hg: mercurio, Cd: cadmio, Pb: plomo

En la Unión Europea hay sistemas de recolección separados para equipos eléctricos y electrónicos, baterías y acumuladores usados.
Por favor, disponga de ellos correctamente en el centro de recolección de residuos/reciclado de la comunidad de su localidad.

Por favor, ayúdenos a proteger el medio ambiente en que vivimos!

DISPOSAL OF UNIT

(Portuguese)
PARA UTILIZADORES DA UE
O símbolo e os sistemas de reciclagem descritos abaixo aplicam-se aos países da UE e não se aplicam aos países noutras áreas do mundo.

O seu produto SANYO foi concebido e fabricado com materiais e componentes de elevada qualidade que podem ser reciclados e/ou reutilizados.

O símbolo significa que o equipamento eléctrico e electrónico, baterias e acumuladores, em final de vida, não devem ser deitados fora juntamente com o lixo doméstico.

Atenção:
Se estiver impresso um símbolo químico debaixo do símbolo de , este símbolo químico significa que a bateria ou acumulador contém um metal pesado numa determinada concentração. Estará indicado da seguinte forma: Hg: mercúrio, Cd: cádmio, Pb: chumbo

Na União Europeia existem sistemas de recolha separados para equipamento eléctrico e electrónico, baterias e acumuladores.
Por favor, entregue-os no seu centro de reciclagem/recolha de lixo local.

Por favor, ajude-nos a conservar o ambiente!

(Italian)
PER UTENTI UE
Il simbolo e i sistemi di riciclaggio descritti di seguito si applicano esclusivamente ai paesi dell'UE.

Questo prodotto SANYO è stato progettato e realizzato con materiali e componenti di elevata qualità che possono essere riciclati e/o riutilizzati.

Il simbolo di riciclaggio mostrato di seguito indica che i dispositivi elettrici ed elettronici, le batterie e gli accumulatori, una volta esauriti, devono essere smaltiti separatamente rispetto ai rifiuti domestici.

Nota:
Se sotto il simbolo di riciclaggio appare un simbolo chimico, esso sta ad indicare che la batteria o l'accumulatore contengono metalli pesanti a determinate concentrazioni. Questo viene specificato come segue: Hg: mercurio, Cd: cadmio, Pb: piombo.

Nell'Unione europea esistono diversi sistemi per la raccolta dei rifiuti speciali quali i dispositivi elettrici ed elettronici, le batterie e gli accumulatori.
Si raccomanda di provvedere allo smaltimento di tali rifiuti secondo quanto previsto dalle normative vigenti in materia.

Aiutaci a conservare l'ambiente!

DISPOSAL OF UNIT

(Dutch)
VOOR GEBRUIKERS IN DE EU
Het symbool en de recycleersystemen die hieronder beschreven worden, zijn van toepassing op de landen in de EU en zijn niet van toepassing op landen in andere delen van de wereld.

Uw SANYO product is ontworpen en gemaakt met materialen en onderdelen van hoge kwaliteit, die gerecycleerd en opnieuw gebruikt kunnen worden.

Het symbool betekent dat elektrische en elektronische apparatuur, batterijen en accu's aan het eind van hun leven apart van uw huisafval weggegooid moeten worden.

Let op:
Indien een chemisch symbool afgedrukt staat onder het symbool, betekent dit chemisch symbool dat de batterij of accu een zwaar metaal met een bepaalde concentratie bevat. Dit wordt als volgt aangegeven: Hg: kwik, Cd: cadmium, Pb: lood

In de Europese Unie zijn afzonderlijke inzamelingssystemen voor gebruikte elektrische en elektronische apparatuur, batterijen en accu's.
Wilt u deze op de juiste manier weggooien bij uw plaatselijk afvalinzameling-/recyclingcentrum in uw buurt?

Help ons het milieu waarin wij leven in stand te houden!

(Swedish)
FÖR ANVÄNDARE INOM EU
Den symbolmärkning och de återvinningssystem som beskrivs här nedan gäller länder inom EU och gäller inte länder i någon annan del av världen.

Din SANYO-produkt har konstruerats och tillverkats med delar och material av hög kvalitet, som kan återvinnas och/eller återanvändas.

Symbolmärkningen innebär att elektrisk och elektronisk utrustning, batterier och ackumulatorer, vid slutet av deras livslängd, inte får slängas som hushållsavfall utan skall slängas separat.

Observera:
Om en kemisk symbol finns tryckt under denna symbolmärkning, betyder denna kemiska symbol att batteriet eller ackumulatorn innehåller en tungmetall med en viss koncentration. Detta indikeras på följande sätt: Hg: kvicksilver, Cd: kadmium, Pb: bly

I den Europeiska Unionen finns det separata uppsamlingssystem för använd elektrisk och elektronisk utrustning, batterier och ackumulatorer.
Gör dig av med sådana saker på rätt sätt på den speciella lokala platsen för återsamling/återanvändning.

Hjälp oss att bevara den miljö vi lever i!

SPECIFICATIONS

Name	Blood Bank Refrigerator	
Model	MBR-1405G	MBR-1405GR
External dimensions	W1440 x D830 x H1950 (mm)	
Internal dimensions	W1320 x D697 x H1500 (mm)	
Effective capacity	1301 L	
Exterior	Painted steel	
Interior	Stainless steel	
Outer door	Painted steel, Provided with 2-layer glass window	
Inner door	Acrylic resin	
Insulation	Rigid polyurethane foamed-in place	
Shelf	Hard steel wire on polyester coating x 12 Allowable load; 40 kg/shelf	-----
Drawer	-----	Stainless steel x 12 Allowable load; 40 kg/drawer
Access port	Inner diameter; 30 mm, Right side, Left side	
Cooling method	Forced cool air circulation	
Compressor	Hermetic type, Output; 250 W x 1	
Evaporator	Fin and tube type	
Condenser	Fin and tube type	
Refrigerant	R-404A	
Defrosting	Cycle defrost + forced defrost, Fully automatic	
Defrost heater	88 W	
Temperature controller	Electronic control system	
Thermometer	Digital thermometer	
Fluorescent lamp	FL40SD x 1	
Alarms	High temp. alarm, Low temp. alarm, Power failure alarm, Door alarm	
Battery	For power failure alarm (6 VDC 1100 mAh, automatic recharge)	
Remote alarm contact	During alarm buzzer and power failure, Output; N.O.; “close”, N.C. “open”	
Weight	276 kg	315 kg
Temperature recorder	7-day type	
Accessories	1 set of key	
Optional components	Interface board (MTR-480)	

✧ Design or specifications will be subject to change without notice.

PERFORMANCE

Model	MBR-1405G, MBR-1405GR				
Temperature control range	4±1.5°C				
Usable ambient temperature	5°C to 35°C				
Noise level	48 dB (A scale) (50 Hz)				
Maximum pressure	1992 kPa				
Rated voltage	AC 110 V	AC 115 V	AC 220 V	AC 230 V	AC 240 V
Rated frequency	60 Hz	60 Hz	50 Hz	50 Hz	50 Hz
Power consumption	370 W	375 W	355 W	360 W	380 W

✧ The above data is measured based on our internal basis.

✧ Design or specifications will be subject to change without notice.

✧ The unit with CE mark complies with EC directives.

⚠ CAUTION

Please fill in this form before servicing.
Hand over this form to the service engineer to keep for his and your safety.

Safety check sheet

1. Refrigerator contents : ☐Yes ☐No
   Risk of infection: ☐Yes ☐No
   Risk of toxicity: ☐Yes ☐No
   Risk from radioactive sources: ☐Yes ☐No

   (List all potentially hazardous materials that have been stored in this unit.)
   Notes :

2. Contamination of the unit
   Unit interior ☐Yes ☐No
   No contamination ☐Yes ☐No
   Decontaminated ☐Yes ☐No
   Contaminated ☐Yes ☐No
   Others:

3. Instructions for safe repair/maintenance of the unit
   a) The unit is safe to work on ☐Yes ☐No
   b) There is some danger (see below) ☐Yes ☐No
   Procedure to be adhered to in order to reduce safety risk indicated in b) below.

Date :
Signature :
Address, Division :
Telephone :

Product name :	Model :	Serial number :	Date of Installation :
Blood Bank Refrigerator	MBR-		

Please decontaminate the unit yourself before calling the service engineer.

SANYO Electric Co., Ltd
Printed in Japan